FOOD INDUSTRIES

The Journal Devoted to the Problems of the Food Manufacturer

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Laurence V. Burton, Editor

Riding Backward

MOST OF US are in the position of passengers looking backward from the observation car on the train of current events. We become aware of movements around curves or on up- or down-grades only as made evident by the events which have passed. We can be certain we are riding on a level plain only after we are able to see clearly the level plain behind the train, and the further back it reaches into the distance the more certain we become that we really are on a level country.

• CURRENT BUSINESS has had much of the aspect of a train ride through very rough country. Many of the passengers are very, very carsick. Even the stoutest hearts and strongest hands are weary of seemingly endless jolting. All are hoping for the train of events to reach a level country once more. We long for a period when we can think and act without fear of another jolt that will require our utmost ability for mere self-preservation.

• RIGHT NOW, nothing seems to hold quite so much appeal as a monotonously straightforward progress through to eternity. All humanity capable of understanding the meaning of a business index would like to be certain that we have reached a point on our journey that means an end to the nerve-wracking descent. Yet we can be sure we have passed the last of the decline only by seeing back of us a reasonably level line.

• GOVERNMENT activities, such as enactment of the Glass-Steagall Bill and similar fiscal policies, hold every probability of being the landmarks of the end of the decline, yet business cannot be certain of it until it can look backward for several months and see the monotonous level.

• SOME very keen observers believe that six months of monotony is just about all that a good, aggressive, restless businessman can stand. By that time the bolder spirits may be expected to enter new ventures and to create new enterprises. But right now the thing most desired is to be able to look backward with a conviction that we are no longer riding downhill.

Frederik Rasmussen

FEW men in the land possess the qualifications necessary to be successful as the secretary of a trade association. The proper conduct of this form of office requires abilities that are almost the attributes of a superman. A list of them is so long that it almost appears ridiculous, yet without such a secretary the association wanes; with him it prospers. If he is big and can lead, the industry grows. With the leadership of such a man there is no problem of raising the money to carry on the constructive work of the association. Presidents may come or go, but if the association is a vital power in its industry it is the secretary who is the continuous motivating force.

Fred Rasmussen, as secretary of the International Association of Ice Cream Manufacturers, possessed all the executive and administrative qualities necessary for success, but he had other gifts than these. His knowledge of the industry was amazing. Very few of its members understood its problems, either technical or business, as well as he, or had his vision and foresight. As a professor of dairy manufactures, as a commissioner of agriculture, or as secretary of one of the few very strong trade associations in the country he was always outstanding.

Continuous Modernization Helps Pay Dividends

CONTINUOUS modernization as a fixed company policy may appear to be too idealistic for competitive business; a useless expenditure of money to replace equipment which, although not up to date, produces a satisfactory product. In a period of rising prices, the soothing lullaby of "let good enough alone" has a particularly strong appeal and becomes the Lorelei for the opportunist who has immediate dividends more in mind than the healthful condition of his business. Not until the bottom drops out of prices and a mad scramble for profitable business is on does modernization, as a fixed policy, have an opportunity to prove indisputably its ability to pay dividends.

The chairman of the board of a large food producing company recently addressed the stockholders with the words, "The physical properties have been maintained in excellent condition and your company continues to be outstanding in its field in the superiority and excellence of its entire physical equipment, both for production and distribution."

This statement is no idle boast as far as those plants which we have visited in 1931 are concerned. Although that branch of the industry has the general reputation of being reactionary and bound by customs and traditions, this company has carried its modernization to the point of using stainless steel where corrosion is likely to occur; has installed the latest type of air-conditioning units in the departments where processing operations are affected by atmospheric conditions; has replaced obsolete heating units by recently developed units designed to utilize the most economical type of fuel available to the particular plant; and has built into its plants drainage systems which are suitable for keeping a food plant in a truly sanitary condition. These improvements are not the result of a recent modernization campaign but have been a part of the company's continuous policy to keep down manufacturing costs by keeping expensive obsolescence charges from getting into the profit and loss statement.

Modernization did not stop here. During this period of falling prices and sales volumes, its leading product was made to conform to the more modern conception of a high-quality article and was backed by a vigorous educational advertising campaign.

It is significant that this company is the only one in its field that has come to our attention as being able to add to its earned surplus and carry a large cash working capital on hand after regular dividend requirements on both preferred and common stocks were paid, and full sinking fund requirements were provided for a year and a half in advance. In fact, its 1931 net earnings per common share were within a few cents of being equal to 1930 earnings.

What better evidence can one have than this that, even in times of business inactivity, it is the modern-minded company that runs a profit-earning business?

Dying of Neglect

POOR old lard! In our own sympathetic way, we shed an editorial tear over the neglect from which this item, once so profitable to meat packers, is suffering. Lard is now so cheap that it is almost given away. Its prices are at the lowest ebb for many years and, as a direct result, fat hogs—400- to 500-lb. porkers—are heavily penalized on the livestock markets.

Poor old lard! Compound and vegetable shortenings have walked away with the market so long that they now command a marked premium over lard. Corn-belt farmers have felt the competition so keenly that last year several abortive movements were instituted to exclude the products of hydrogenated cottonseed oil by some such taxation method as that which dairy farmers have employed in defense of butter.

Yet, in spite of the obvious need for an improvement of the market for lard, there was not a single advocate for lard present at the recent convention of the Society of Bakery Engineers. In a four-day session of practical bakers, not once was a voice raised in its behalf. Quite a contrast, this, to the presence of the technical service staffs of makers of every other type of shortening except butter and margarine, who were all present. Whenever discussion turned to shortening, there was always at hand a trained bakery engineer to explain or expound the proper use of non-lard shortenings, but lard was without a single advocate.

With a few more years of neglect, lard will cease to be mentioned by bakers except in an historical sense.

Too Bad You Missed It!

ORDINARILY there are too many interesting events in the future to warrant looking backward at a past convention; but in this exceptional instance we cannot avoid comment on the unusual meeting called the Second Packaging Conference and its Packaging Clinics, held in Chicago during the week of March 7. When it is realized that, roughly, three out of every four of the packages which were analyzed and criticized, by both professionals and consulting experts, were food packages, the packaging conference takes on a new aspect of great significance to all food manufacturers.

As an industrial convention it was in a class by itself, for no other convention is based on a horizontal function. Where others deal with the vertical problems of a single

industry, this one deals with a common problem of all industries: packaging. Meat packers, canners, cereal manufacturers, macaroni makers, confectioners, and bakers were there; machinery, methods, and materials were on display; while the sessions and clinics discussed packages and packaging from every conceivable angle, including production, construction, design, utility, display, merchandising, color, and self-selling.

The best thought expressed, in our opinion, was enunciated by R. L. Beach, of General Electric Company, who stated that the proper amount of money to spend on the package for an article can be defined as that amount which will produce sales at the lowest unit cost. Thus too costly packages may put the product out of the market and too cheap packages may result in too little consumer appeal. If the product is not properly protected by its package, the customer will be dissatisfied, and yet no customer will pay for unnecessary protection or decoration. This engineering approach to the problem of packaging costs, based on logical reasoning, should be very helpful to those who are struggling with present-day problems of merchandising.

When in Rome—

AS THIS is written, telling Congress how the country's tax problem ought not to be solved has become a favorite indoor sport. Everybody, from columnist to coal heaver, has joined in the weeping and wailing and gnashing of teeth, and practically everybody has a "much more sensible plan." The perfect tax, obviously, is the tax on "everyone else but me."

But in speaking thus lightly of the "not me" protests, we are certainly not opposing them. So long as the only science that goes into a tax bill is the science of swapping concessions for votes, self-preservation demands that such a stand be taken, and that every last bit of influence be used to back it. When the meek shall finally inherit the earth, they probably will be greeted by 100 per cent inheritance taxes.

Without going into the merits of a balanced budget, government expenditures, or the principles of a general sales tax at all, the practical workings of tax legislation make one point clear. The original decision to exempt fresh foods from the sales tax was certainly not framed for the welfare of the poor consumer. A fresh avacado is hardly as necessary as a $2 pair of pants, to which the tax would have applied. Aside from Bibles and a few other traditional gestures to indicate how holy the tax was, the original exemptions were obviously made to offset in advance the well-organized and effective howls of groups whose political power was great enough to defeat the bill. If a sales tax ever goes through, exempt food manufacturers can thank the organized farm groups whose products they purchase.

The exemption for canned fruits and vegetables added to the bill early in its career can be nicely explained on the basis of logic. If fresh artichokes are necessary to life, canned tomatoes are surely a thousand times more so. But the most persuasive logician that the Canners' Association could have hired would not have got half way up Pennsylvania Avenue with this argument if it had not been for the fact that growers of canning crops were just as skilled in the art of vote-powered protest as were the growers of corn and cantaloupes.

Of course, this is not news to other manufacturers who would have been subject to the sales tax provisions. They realize it well enough; it just so happened that they had not yet massed the necessary quantity of vote-casting "don't-you-dares." Now, with the demise of the sales tax in the House, these other groups of manufacturers apparently are relieved of the danger—temporarily, at least.

It is significant, however, that the food industries as a whole, if properly organized in a unified group, would have political power as great as any organization in the country today. And in a Rome where such influence controls legislative action, the food industries might better join other unified groups of Romans in the gallery than battle individually down among the tax-collecting tigers, who, after all, have to get a square meal somewhere.

Packaging to Increase Sales

A NEW WAY to cut something off part of the costs of distribution arises from combining naturally associated products in the same package. Readers who saw military service in the World War will doubtless recall the "Iron Ration" of the British and Belgian troops, much of which was manufactured in Chicago. While this was not the first instance of packaging associated products in a single container, it probably was the earliest large-scale commercial utilization of the principle.

A broader development of the idea of association in the field of food manufacture was seen in the "spaghetti dinner" package, containing separate portions of spaghetti, sauce, and grated cheese, which made its first appearance along about 1923. Cooperative advertising of companion or complementary products has become quite familiar to newspaper readers during the last three or four years.

However, by proposing to package together the complementary products of food manufacturers, the idea is advanced a step further. In such a plan, of course, the products must be those which are either non-perishable or of approximately equal shelf-life. One suspects that, if this form of cooperative packaging is to be extended to independent food manufacturers, the brand names of the foods used should be favorably and equally well known.

Items from the varied line of goods from a single firm probably offer the most certain possibilities. We feel, however, that those who may see the possibilities of this form of merchandising should place the selling emphasis on the complementary product rather than on the package itself, and suggest that many firms in the past have had some experience in this line through their sale of Christmas combinations. We have a recollection of one or two distinct, though fortunately small-sized, flops arising out of improper emphasis on the container.

A few possible combinations which might serve to stimulate the imagination as to the possibilities of combination packaging are: pancake flour and syrup; butter and "Oven-Ready" biscuits; grated parmesan or Caccio Cavallo cheese and spaghetti; canned tomato sauce with cheese and spaghetti; chow mein, soy bean sauce, and noodles.

Combination packaging can be made a useful tool of merchandising, introducing new products or actually cutting down distribution costs through multiple sales, but it must be preceded by unusually careful study of relative distribution problems and shelf-life of the component units thus brought together.

Off-Season Bottling Costs Lowered by Small Units

By E. S. STATELER
Assistant Editor, Food Industries

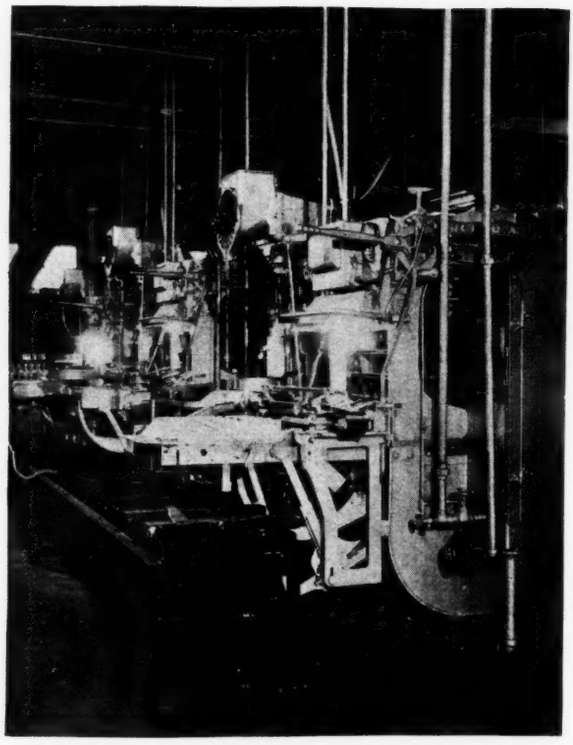
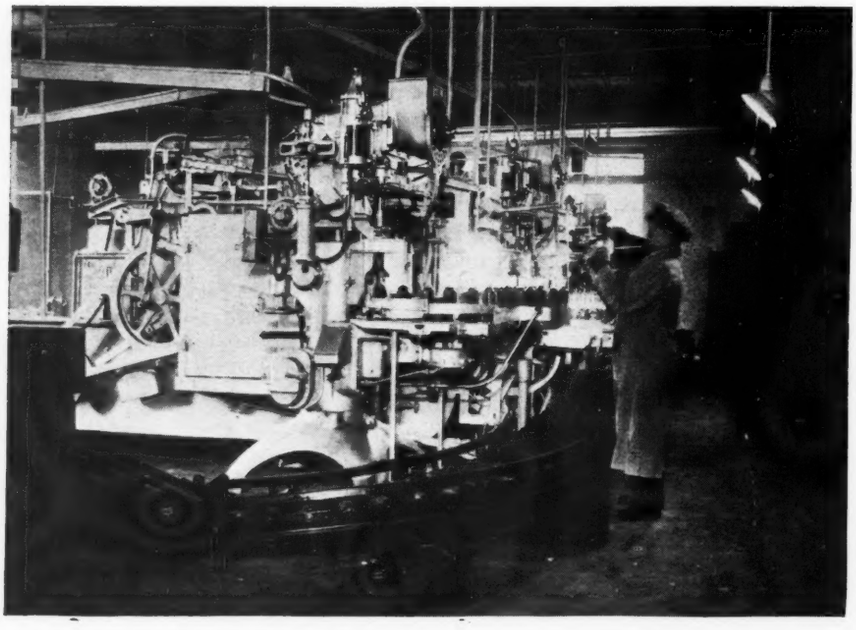


Fig. 2—View showing relation of various bottling-plant units

PRESENT-DAY business conditions are proving the wisdom of plant modernization which provides for seasonal fluctuations. During the past fifteen to twenty years in which mass production has been in the saddle, there has been a definite program to install ways and means of getting high-capacity production at low unit cost, with the result that there is an overproduction capacity throughout the food industries. In flush seasons these plants operate quite efficiently and show the owners profitable returns while they are in full operation. Unfortunately, during dull seasons or in poor business years these plants must be kept inactive or operated at high production costs. In either case they lose money for their owners; high-production-cost products have little chance to be sold at a profit in a highly competitive market.

Fig. 1—View of bottling plant in off-season operation



This overproduction capacity for off-season operation usually is due to the installation of large-size units which have to be operated in their entirety regardless of whether a low- or a full-capacity production is desired. If operated at low capacity the expense is prohibitive. If operated occasionally at full capacity, the cost of making preparations for operation and of cleaning up for a shutdown offsets any advantage gained by full-capacity operation. Furthermore, such sporadic operation adds to the problems of labor employment and of capital utilization.

Such conditions may be avoided by the installation of smaller units which have the total capacity of a larger unit. They may cost a little more to install but they have the advantage of being operated individually or collectively as the demand for the product justifies. When this plan of modernization is followed, the manufacturer has complete unit plants for dull seasons which collectively comprise a high-production plant for high-demand periods.

The carbonated and cereal beverage industry is one that experiences wide

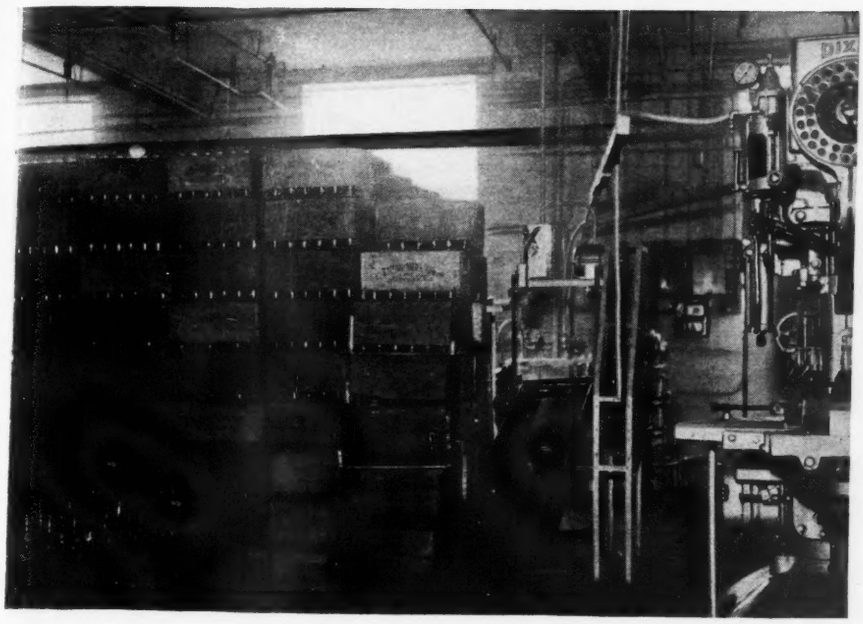


Fig. 3—Short belt conveyor carries filled bottles to foot of elevator conveyor. Storage area on left. Filling and capping unit on right

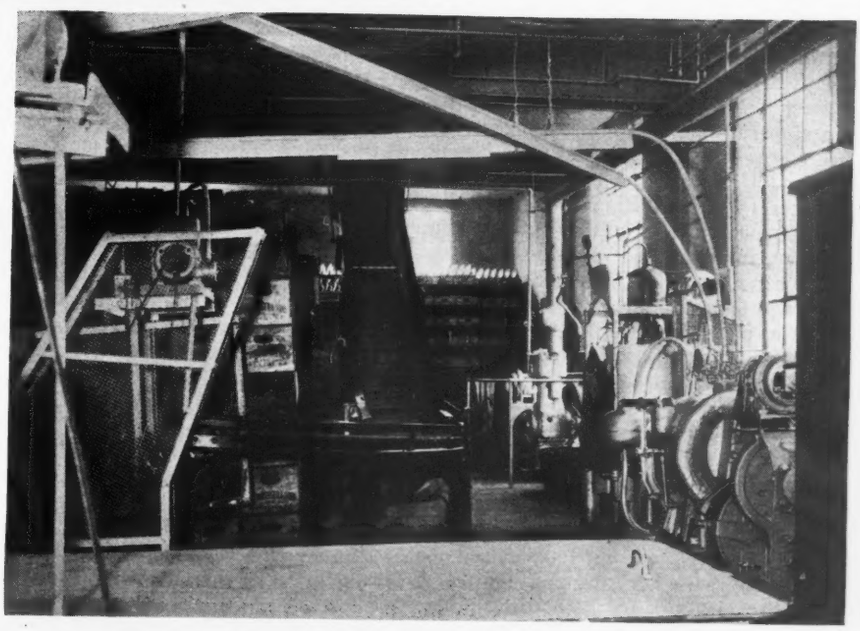


Fig. 4 — Elevator conveyor delivers to floor above. Compressor, carbonator, and water cooler on right

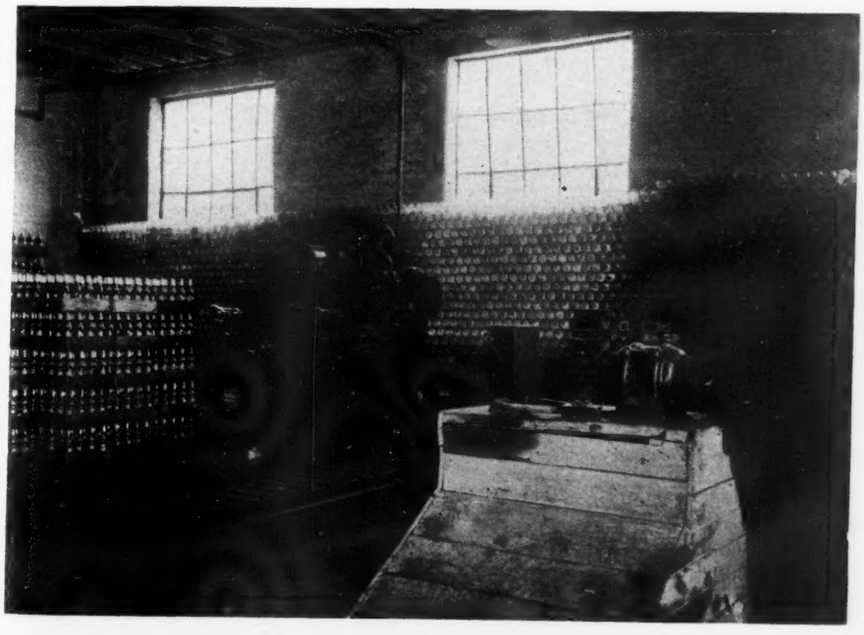


Fig. 5—Roller conveyor delivers filled bottles to labeling machines. Cases of beverages ready for shipment on left

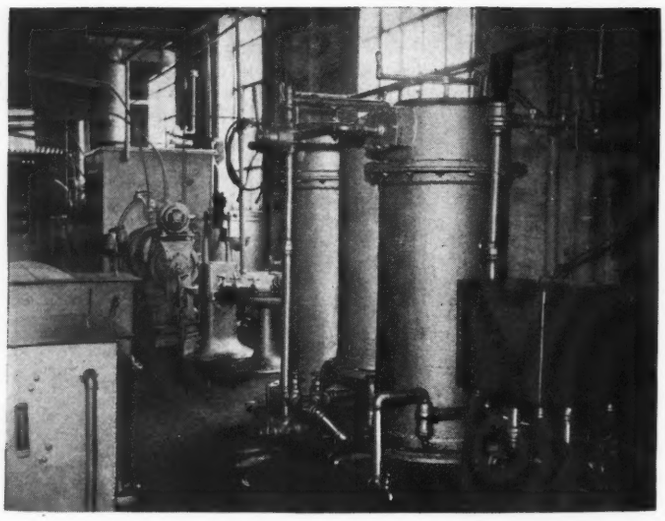


Fig. 6 — Water treating units

fluctuations not only according to the seasons of the year but also because of climatic changes during a season. As recent as during the past summer season, manufacturers of these beverages suffered heavily because rainy or cool weather periods came so abruptly after a stretch of quite hot weather that the large operators quickly found themselves overstocked. If they shut down their plants, a sudden change to hotter weather, with resulting increased demand, would just as quickly throw them into an understocked condition. General economic conditions had curtailed beverage consumption to such an extent that the plants, at best, were operating on a reduced production schedule. When forced to curtail production still further on account of climatic conditions, these larger units not only failed to show a profit; they actually lost money for their owners during the cool weather periods.

Foreseeing that such a condition might arise, L. Steinberger & Sons, Inc., Jersey City, N. J., when it modernized its plant two years ago, decided against a large-capacity unit for its bottling plant. The large-capacity unit would have represented a capital outlay of approximately 10 per cent less than smaller units, which collectively have the same production capacity, and would require approximately 25 per cent less floor space. However, such a unit would require the labor of six men regardless of whether it was operating at full or low capacity. It would be so inelastic in its operation of handling "split runs" for bottles of different sizes that approximately 20 per cent of the operating time would be wasted in making setup changes incidental to changes in size of bottles for these "split runs" which are so prevalent in low-demand periods.

Concluding that the advantages of flexibility in operation outweighed the higher installation costs, the company chose three one-man units of the bottle washer, filler, and capper combination. These units have an output capacity of 12 28-oz., 18 12-oz., or 24 10- or 6-oz. bottles per minute and may be operated individually or collectively according to the market demand for the beverages. In flush season this installation permits the running of as many as three different sized bottles at one time.

Provision is made on both sides of this installation for additional units as the growth of the business justifies. At present these areas are used for the storage of returned bottles waiting to be washed and filled. In flush season, when all these units are operating, cases of empty bottles are conveyed by a roller conveyor from the storage areas to the units where the bottles are fed into the washer and the cases refilled by bottles from the filling-capping machine. Because the bottles move automatically from the feeding table into the washer, through the washer, from the washer to the filler, and through the filler and capper to the discharge apron at the rate of 12 28-oz., 18 12-oz., and 24 10- or 6-oz. bottles per minute, one operator for each unit is all that is necessary for continuous operation of that unit throughout the working day.

During slack periods when very low production for the plant is desired, the operator stacks a supply of empty bottles convenient to his unit and operates it as if the empty bottles were being supplied by the roller conveyor.

At the filling machine the bottle is automatically supplied with a measured quantity of syrup fed to each filler by means of a block tin piping connected with the glass-lined syrup mixing tanks on the floor above. At the next station on the filling machine the bottles are automatically filled with water which has passed through an aluminum-plate electric sterilizer, flint and paper disk filters, and a 40 deg. F. cooling unit before being charged with CO_2 gas. At the final station on this same machine the bottles are automatically capped and discharged onto a discharge apron ready for the operator to inspect and place in cases.

From this filling and capping machine the cases of filled bottles are carried by a roller conveyer to a belt-type elevator conveyor which takes them to the floor above and delivers them to another roller conveyor. This conveyor delivers the bottles to a point convenient to the labeling machines, in which they are labeled and foiled by two manually operated machines in flush seasons or by one during slack periods. When labeled, the cases of finished goods are temporarily stacked adjacent to the labeling machines and either transferred to shipping-room stock or delivered to shipping trucks by roller conveyors.

During slack season operation, one man does the labeling, mixes the flavoring syrups, and washes out and sterilizes the syrup line to the filler whenever a change in flavor of beverage is being made. During this interval the washer-filler operator resupplies himself with empty bottles, makes the necessary changes in his unit, and performs the other incidental duties necessary to the operation of his unit.

In the rush season this composite plant requires the capacity operation of all three units and the labor of eight men. During extremely dull periods a single unit can be operated on any of the four sized bottles and requires the labor of only two men. In this manner a multiple-unit flush-season production plant becomes a low-cost plant under low-production conditions.

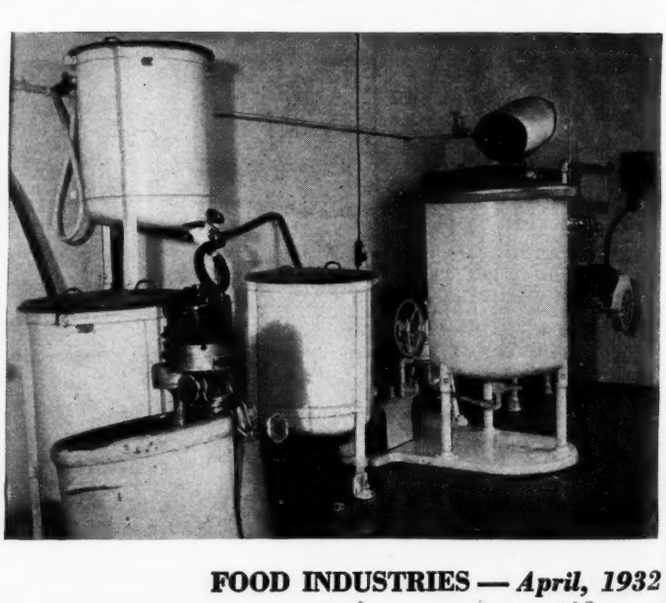
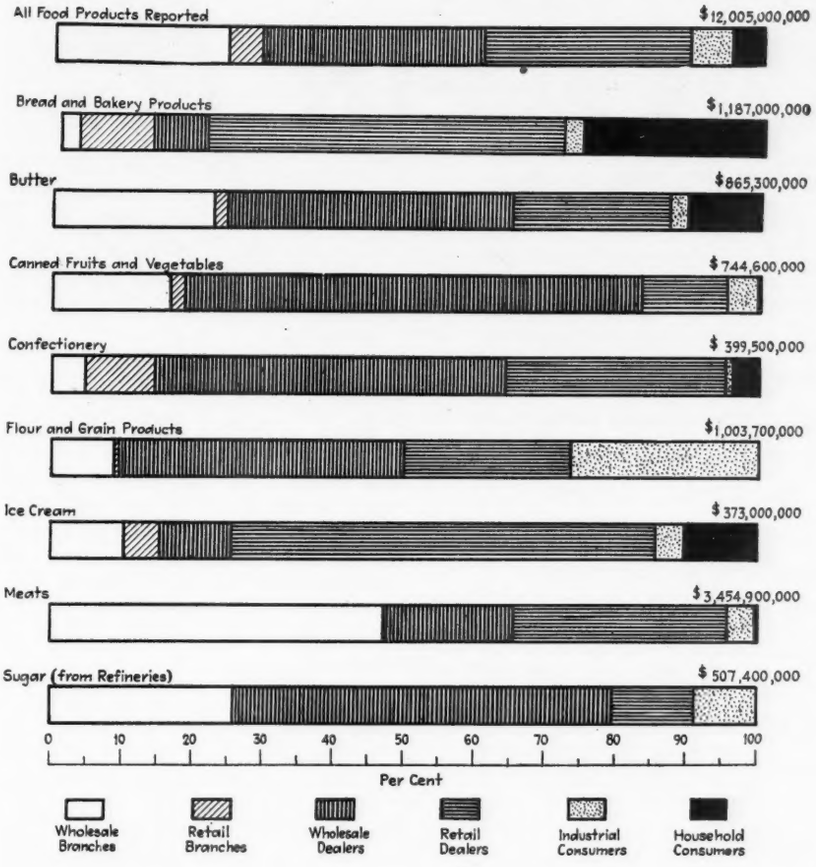


Fig. 7—Syrup mixing equipment

How $12,000,000,000 Worth Of Food Goes to Market



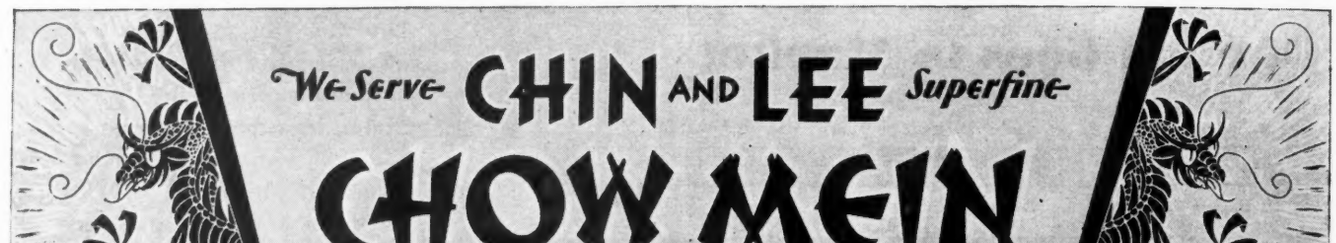
INITIAL SALES channels for almost sixty billion dollars worth of products, over 80 per cent of the total value of manufactures in the United States, have been outlined in the 1929 Census of Distribution. Of this sixty billion, one-fifth was for products of the food industries.

Summary of U. S. Census of Distribution Figures

Sales Reported by Manufacturers of	Total Value of Sales	Sales to Owned Branches				Sales to Dealers				Sales to Consumers			
		Wholesale		Retail		Wholesale		Retail		Industrial		Household	
	$ 1,000,000	Per Cent	$ 1,000,000	Per Cent	$ 1,000,000	Per Cent	$ 1,000,000	Per Cent	$ 1,000,000	Per Cent	$ 1,000,000	Per Cent	$ 1,000,000
Beverages	270.3	3.9	10.6	1.5	4.2	26.3	71.2	61.4	165.8	2.4	6.4	4.5	12.1
Biscuit and Crackers	276.1	53.9	148.9	3.1	8.4	8.0	22.2	34.4	94.9	0.4	1.1	0.2	0.6
Bread and Other Bakery Products	1,187.0	2.4	28.2	11.1	132.1	7.4	87.9	50.8	603.3	3.1	36.9	25.2	298.6
Butter	865.3	22.5	194.7	2.3	20.0	39.6	342.8	22.8	197.2	2.6	22.0	10.2	88.6
Canned Fish, etc	76.3	3.7	2.8	0.4	0.3	84.8	64.7	8.7	6.7	2.0	1.5	0.4	0.3
Canned Fruits and Vegetables	744.6	16.3	121.1	2.3	17.4	67.6	503.5	9.5	70.3	4.0	30.0	0.3	2.3
Cereal Preparations	175.2	.....	.....	.....	.....	89.7†	157.2†	8.8	15.4	1.5	2.6	.....	.....
Cheese	120.7	76.4*	92.2*	1.6	2.0	.....	.....	6.6	8.0	8.1	9.7	7.3	8.8
Chewing Gum	60.8	.....	.....	.....	.....	86.1	52.4	13.7	8.3	0.2	0.1	.....	.....
Chocolate and Cocoa Products	107.8	9.1	9.8	.....	.....	69.3	74.7	16.4	17.7	5.2	5.6	.....	.....
Coffee and Spice	441.1	22.9	101.1	14.9	65.5	21.5	94.9	36.7	161.9	3.2	14.0	0.8	3.7
Condensed and Evaporated Milk	293.0	35.9	105.1	6.0	17.6	42.4	124.3	6.5	19.2	6.0	17.5	3.2	9.3
Confectionery	399.5	4.8	19.0	9.2	36.9	54.4	217.3	26.8	107.1	1.3	5.2	3.5	14.0
Corn Syrup, Sugar, and Starch	164.6	.....	.....	.....	.....	54.8	90.1	.....	.....	45.2	74.5	.....	.....
Feeds	423.6	4.7	19.8	9.2	39.2	27.6	117.0	41.4	175.3	17.1	72.3	.....	.....
Flavoring Extracts and Syrups	128.5	7.6	9.8	3.8	4.9	63.2	81.2	13.8	17.7	9.9	12.7	1.7	2.2
Flour and Grain Products	1,003.7	7.7	77.3	1.4	14.1	40.3	404.7	27.1	271.9	23.5	235.7	.....	.....
Foods Miscellaneous	177.6	24.2	42.9	1.3	2.4	44.3	78.7	17.6	31.2	11.7	20.8	0.9	1.6
Ice Cream	373.0	10.4	38.8	4.7	17.5	10.6	39.5	60.4	225.3	2.9	10.9	11.0	41.0
Lard Substitutes and Vegetable Oils	152.8	78.9	120.7	.....	.....	13.6	20.7	1.4	2.1	6.1	9.3	.....	.....
Macaroni, etc	46.9	3.1	1.4	.....	.....	54.0	25.4	34.6†	16.2†	6.7	3.2	1.6	0.7
Malt	22.9	.....	.....	.....	.....	23.1	5.3	23.7	5.4	53.2	12.2	.....	.....
Meat	3,454.9	46.9	1,621.5	1.0	35.1	17.8	615.8	30.6	1,057.0	3.1	106.0	0.6	19.5
Oleo and Other Butter Substitutes	46.5	12.5	5.8	.....	.....	53.3	24.8	31.9	14.8	2.3	1.1	.....	.....
Nuts	49.6	14.9	7.4	.....	.....	74.0	36.7	3.2	1.6	7.6	3.8	0.3	0.1
Poultry	142.0	33.2	47.1	1.0	1.4	47.3	67.2	14.2	20.2	2.9	4.1	1.4	2.0
Rice	48.8	3.9	1.9	.....	.....	90.2	44.0	.....	.....	5.9	2.9	.....	.....
Sausage	117.6	6.0	7.1	2.8	3.3	24.5	28.8	59.6	70.1	3.6	4.2	3.5	4.1
Sugar, Beet	98.6	.....	.....	.....	.....	93.9	92.6	.....	.....	6.1	6.0	.....	.....
Sugar, Cane	17.3	.....	.....	.....	.....	43.9	7.6	0.2	0.0	55.9	9.7	.....	.....
Sugar, Refined, Cane	507.4	26.1	132.3	.....	.....	53.3	270.4	12.1	61.5	8.5	43.2	.....	.....
Vinegar and Cider	11.0	2.8	0.3	1.1	0.1	71.5	7.9	12.9	1.4	10.6	1.2	1.1	0.1
Total (food industries)	12,005.0	24.8	2,967.6	3.5	422.4	32.2	3,871.5	28.8	3,447.5	6.6	786.4	4.2	509.6
Total (all industry)	59,662.3	16.5	9,871.0	2.1	1,261.5	31.1	18,526.1	19.8	11,806.7	28.8	17,180.1	1.7	1,016.8

*Includes some sales to non-owned agencies. †Includes some sales to manufacturers' owned branches.

Note—In a few cases a small percentage of the gross sales of the industry could not be classified by companies reporting; in a few other cases the gross sales include secondary products in small amount handled by the industry in addition to its major line of commodities.



New Yorkers know this sign. Placarded on plate glass fronts of eating places, high and low, it attracts the customers who have helped to make Chin & Lee the world's largest distributors of fresh chow mein. Now "dinners-for-two"—combination packages of glass-packed chow mein and its auxiliaries—are expanding markets to the home. In both fields, continually increasing sales bespeak the success of this curious blend of Oriental tradition and American enterprise.

By E. SCOTT PATTISON
Assistant Editor, Food Industries

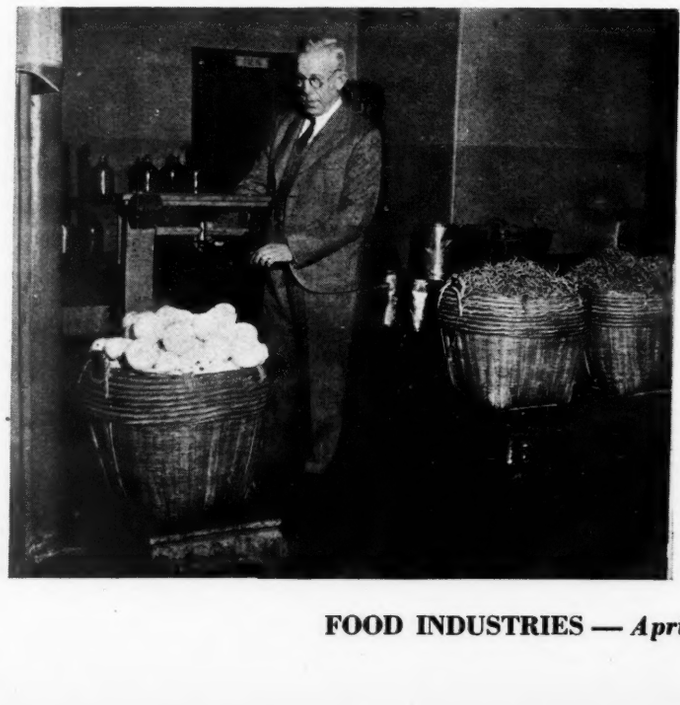
IN the dim and dragon-painted interiors of Chinese restaurants, there was something a bit mysterious about chow mein. Shop girls, consuming the unfamiliar ingredients to the pseudo-oriental strains of "Under a Shanghai Moon," imagined themselves to be going mildly native.

But that was several years ago, before Tong Y. Chin and Tuck Y. Lee, combining Eastern insight with Western business acumen, sensed that it was primarily the taste, not the atmosphere, that was making chow mein a popular dish. Now the chow mein of Chin & Lee Co.—well over a million dollars worth last year—has become a staple to thousands of New Yorkers in all walks of life. Nickels click for it at automatic restaurants. Without so much as a chop stick for atmosphere, it competes with corned beef and cabbage, displaces toasted sandwiches at drug store counters, even invades that stronghold of the bean,—the Brooklyn Navy Yard. Originally introduced on menus as a weekly "variety item," for people who wanted a change, it now goes to many outlets every day in the week. Moreover, things are busier than ever this year at the gayly painted plant on Bank Street, Greenwich Village. Though the depression has hit some individual outlets, it has not turned the sales curve from its upward thrust; demand from additional outlets has put January, 1932, well ahead of January, 1931.

From a limited distribution on the Island of Manhattan three years ago, the business of supplying fresh chow mein to restaurants, drug stores, schools, even hospitals, has expanded to include all of the Metropolitan Area, with branch plants in New Haven, Conn., and Newark, N. J., serving additional territories within a radius of about 100 miles.

The chow mein distributed to restaurants and other eating places is made only in quantities necessary to fill orders received the preceding day. It is delivered in one- to five-gallon slip-cover tin cans, often still hot, by one of the 48 trucks that the company now has in service. Along with every gallon of chow mein goes 2 lb. of fried noodles, 2½ lb. of boiled rice, a package of shredded eggs for garnishing, and enough soy bean sauce to replenish the restaurant's supply. These auxiliaries are included in the flat price per gallon at which the chow mein is sold.

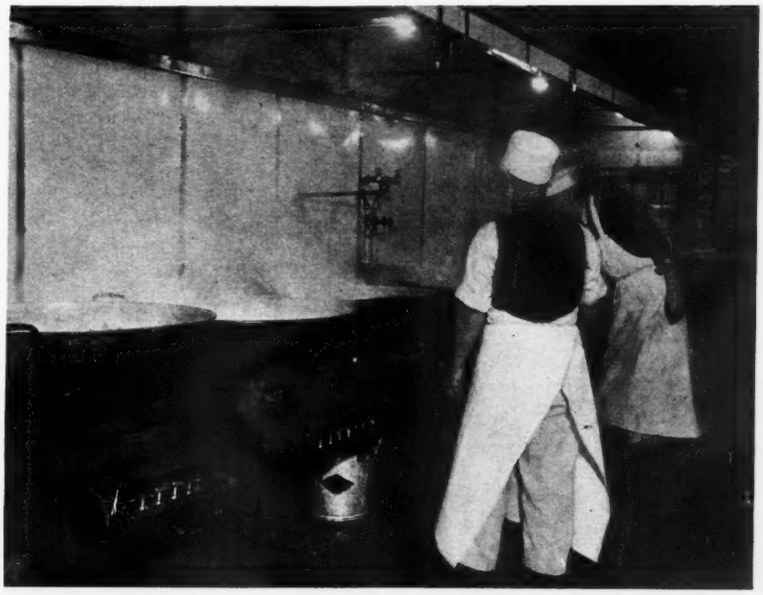
H. W. Walls, general manager of Chin & Lee Co., checks the ingredients that go into chow mein. Only large Bermuda onions are used



Although daily sales of fresh chow mein in bulk have exceeded 2,000 gal. per day, sales of chow mein packed in glass for home consumption appear to have equally important, if not more important, possibilities for the future. The "chow mein dinner for two," sold through retail stores for home use, consists of a combination package containing a 10½-oz. jar of chow mein, vacuum-sealed and sterilized; a sealed carton of fried noodles; a 1-oz. bottle of soy bean sauce, and two tea balls. Although distribution of the combination package has so far been limited to food distributors serving independent outlets, sales now constitute about 20 per cent of the plant output and total about 6,000 doz. packages a week. More widespread distribution, as well as the use of chain stores as outlets, is now being planned.

For sale in "dinners-for-two," chow mein is vacuum-sealed in 10½-oz. glass jars with lacquered aluminum caps

In spite of the general opinion that chop suey and chow mein are not really Chinese dishes at all, but only Americanized ideas of what the Chinese should want to eat, preparation of Chin & Lee's chow mein is oriental in many of its features. Beet sprouts, bamboo shoots, soy bean sauce, and other flavoring materials are imported from China. The blending and cooking is done by Chinese chefs. No steps to cut costs by Americanizing production methods that required compromise with the original formula have been permitted.



Chinese chefs cook the chow mein in gas-fired open pans. They contend that small batch operations using direct heat are necessary to bring out the true flavor

Production of a standardized product using high-quality ingredients has been advantageous on a strictly business basis. Competitors found it easy to cut prices—with a chow mein having a higher water content, for example. The difference in quality, however, more than offset the difference in price. Hearts of California celery used in Chin & Lee's chow mein cost two or three times as much as cheaper celery that might be substituted. The use of large Spanish onions exclusively also raises raw-material costs, but results in improved flavor that justifies itself in the long run. Quality is greatly influenced also by the meat used. Incidentally, pork chow mein is the larger seller, but beef, veal, shrimp, and mushroom chow mein also are popular.

To the food engineer familiar with cookers for large-scale operations, the iron pans heated by gas burners in which the chow mein is prepared will not appear particularly efficient. But the Chinese chef considers this method of cooking with direct heat the only method by which the original flavor of this dish—as it would be prepared in individual quantities—can be developed. As a matter of fact, an effort was made at one time to use steam-jacketed kettles of considerably larger unit capacity, but the chefs did not find it possible to produce a product having the same characteristics as that cooked by direct heat in smaller batches. A line of ten cookers provides the necessary capacity.

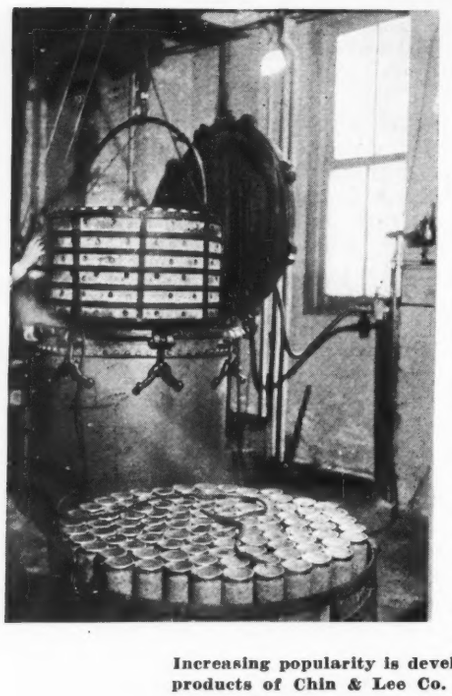
To make chow mein as they feel it should be made, they limit the size of batch to 15 gal., and add the ingredients in a traditional order. During the time of cook, which ranges up to 90 min., they make a ritual of mixing and stirring. Removed from the pans, chow mein for bulk distribution is packed in slip-cover cans while still hot. Empty tins are returned to the plant, washed, and used the following day.

If cooking of the chow mein seems essentially oriental, in spite of the modern appearance of the white enamel paneling and hood above the cookers, the opposite side of the floor, where chow mein is packed in glass, has little oriental atmosphere. The filling machine, vacuum-sealer, and retort are familiar American equipment of standard design. Chow mein to be distributed in preserved form is cooled, filled into jars, and vacuum-sealed with lacquered aluminum caps. Jars are then loaded into retort baskets holding about 1,800 jars. A sterilization period of two hours with steam at 240 deg. F. has been found satisfactory. Steam is supplied by two automatic gas-fired boilers. When cooled and labeled, the jars are packed in the "dinner-for-two" cartons, along with the tea balls, sauce, and fried noodles.

"Are the noodles crisp?" This is ordinarily the first criterion by which a consumer judges a dish of chow mein. To produce crisp, non-greasy noodles in the volume required was not a simple problem. Considerable research was required before a refined corn oil was

Noodles are fried in refined corn oil. Two pounds accompany each gallon of chow mein

About 1,800 jars of chow mein go into each retort basket to be sterilized at 240 deg. F. for two hours



secured which, at the proper frying temperature, would brown the noodles all the way through. The fried noodles uniformly golden brown are cooled in the imported wicker baskets shown in the photograph and then weighed and bagged for delivery to outlets for bulk chow mein.

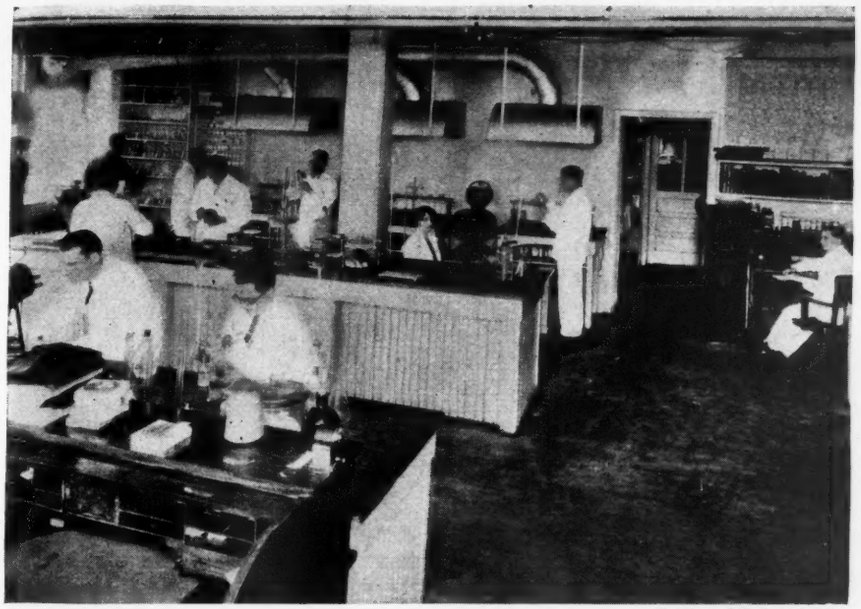
Noodles for the combination packages, which may be in the hands of retail dealers for weeks, need careful packaging in addition to careful frying. They are now packed in glassine bags inclosed in sealed cardboard cartons. The success of the efforts to produce noodles of lasting crispness is indicated by the fact that, soon after the package was introduced, requests began coming in for additional packages of noodles to be used for other purposes in the menu. The requests reached such proportions that fried noodles are now being sold separately. Transparent cellulose bags of fried noodles retailing at 10c., although on the market only a few weeks, are proving a popular item.

Further indication of the quality of the auxiliary products that are making the chow mein combination a popular item is shown by a similar reaction to the tea balls that were included. Keemun tea, a particular Chinese blend, was originally developed with only the combination dinner in mind. The demand for more tea of the same blend which followed, however, was looked upon as an opportunity too good to neglect. Separate sale of the tea balls was introduced March 1, this year. Additional sales stimulus for this development is being secured by the use of attractive Chinese boxes of such dimensions that they may be used for holding cigarettes when the tea balls are used.

Mr. Chin, president of the organization, and Mr. Lee, vice-president and treasurer, are both Chinese graduates of American colleges. There is no trace of the oriental, however, in H. W. Walls, genial American general manager; he confesses that the ways of his Chinese chefs are mysterious, but he is able to keep things in the plant running smoothly nevertheless. Fred S. Silverman, sales manager, is also not likely to be confused with oriental members of the organization.

Distribution of chow mein in bulk is handled directly by salesmen of Chin & Lee Co. Sale of the specialties for retail trade, however, is handled by an affiliate, Tuck Wen, Inc. This organization sells the "dinners-for-two," tea balls, and noodles chiefly to wagon jobbers. At the present time, about fifty distributors, principally in the Northeast, are handling the products.

Increasing popularity is developing for each of these three products of Chin & Lee Co. Tea and noodles are being marketed to satisfy demands resulting for the sale of the combination package



Courtesy of Rockwood & Co.

Fig. 1—General view of a chemical laboratory in a chocolate plant

Moisture Increases Viscosity Of Chocolate Coating

By GEORGE DEFREN
Consulting Chemist
Newton, Mass.

A NORMAL chocolate liquor has a higher viscosity than a chocolate coating or a sugar-cocoa butter mixture containing the same percentage of cocoa butter as the chocolate liquor. This fact was determined by a comparative test which indicated that the sugar-cocoa butter mixture was the lowest, with the coating second and the liquor third in viscosity rating.

Since the solid contents of all three were ground, as far as was humanly possible, to equal fineness and to a finer state than is customary, some explanation was sought.

When fundamentals are considered, a chocolate coating is colloidal and contains a small percentage of moisture. It also conforms to the definition of one type of an emulsion, consisting of a solid phase and two liquid phases which are intermingled so intimately that the liquid phases are prevented from coalescing and appearing as distinct layers. In this three-phase system, the liquid phases are the melted cocoa butter and the moisture; the solid phase is the cocoa mass and, when present, the finely ground sugar.

The cocoa mass is especially important because fat-free cocoa, when brought into contact with liquid cocoa butter, not only adsorbs the cocoa butter on its surface but draws the melted cocoa butter into its interior, like a sponge, by capillary attraction, due to its fibrous and cellular structure. Thus any appreciable per cent of moisture in a nib or liquor makes a three-component emulsion analogous to that of mayonnaise in which the disintegrated cells of the finely divided cocoa mass act as the interface between any moisture and the cocoa butter. As a result the liquor is viscous.

It is known that if a little water be added to a liquid chocolate coating during agitation or processing operations, the latter becomes very hot and much "thicker" or, technically speaking, more viscous. When it contains about 5 per cent of water, this chocolate coating, even if hot, can be cut with a knife like cold fudge. Adding more water gradually "thins" the mixture to any desired extent. Upon drying, the stiff chocolate paste, containing about 5 per cent or more moisture, gradually becomes liquid again, especially if refined, until it regains its former viscosity. Further drying makes the coating even more fluid; which is to say less viscous. If it were possible to remove all of the moisture from the cocoa mass, we would have a two-component system whose viscosity would approach that of the sugar-cocoa butter mixture.

To determine the close relationship between moisture content and the viscosity of chocolate coatings, a commercial sized batch containing more moisture than is customary and having an uncertain viscosity of over 400 sec. was

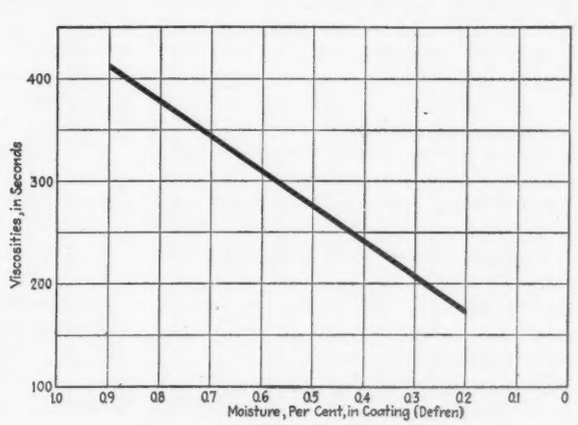


Fig. 2—Viscosity of chocolate coating decreases directly with decrease in moisture content

tested on a home-made viscosimeter in which 5 lb. of coating at 100 deg. F. was run through an opening in a variable period of time. The coating used was entirely too thick (too "heavy" or viscous) for hand-dipping; but by the elimination of moisture through progressive stages, the following results were obtained:

Per Cent of Moisture	Viscosity
1.1 (0.9)	400 (?) Sec.
0.9 (0.7)	343 Sec.
0.8 (0.6)	307 Sec.
0.5 (0.3)	209 Sec.
0.4 (0.2)	170 Sec.

The figures in parentheses probably represent more nearly the true moisture percentage. It may be of interest to note that the 0.2 to 0.6 per cent loss in weight on heating cocoa butter to 100-110 deg. C., especially in vacuum, is only partially due to moisture. Some other volatile constituents, at present undetermined, are also represented in such loss, but generally calculated as "moisture."

While 170 sec. viscosity was higher by 80 to 120 sec. than is customary for hand dipping, the batch was used up without complaint from any operator. The work had beautiful raised "strings" and a good "gloss." Evidently a marked saving in cocoa butter can be attained by removing the moisture from cocoa beans, or from the liquor or coating made from them. Based on experience, this would represent about 2 per cent of cocoa butter in a coating.

As granulated sugar and cocoa butter have practically only a small moisture content, it is evident that the moisture in the coating came from the bean, where it had not been completely removed during the roasting. This percentage of moisture continued into the nibs and liquor, and its relative magnitude was lowered by the added sugar and cocoa butter in making the coating.

The gradual increase in viscosity of chocolate coatings subjected to prolonged conching, or longituding, is another interesting and related problem, although not within the scope of this paper.

It requires but little calculation to visualize the effect such a saving of cocoa butter as is outlined herein would make on the chocolate industry. It certainly would influence the cocoa powder problem.

a—Scraping knife for stirring

b—Thermometer in water bath

c—Thermometer in chocolate @ 100 deg. F.

d—Overflow holes for maintenance of pressure level

e—Reservoir for overflow

f—Receptacle for coating under test

g—Water jacket

h—Cork

i—Tripod

j—5 lb. weight

k—Pan having 5 lb. capacity

l—Bunsen burner

m—Gas hose

n—Scale

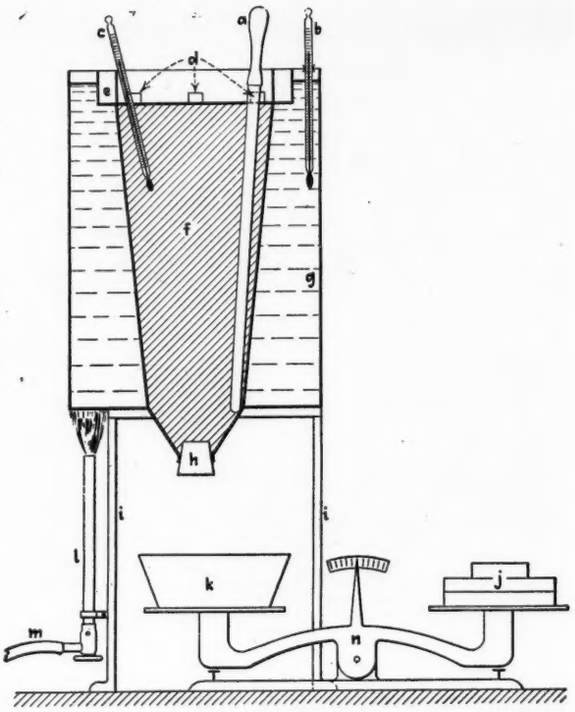


Fig. 3—Improvised viscosimeter used to determine effect of moisture content in chocolate coating

▼ ▼ ▼

Leather Belting Now Sold By Thickness

THE American Leather Belting Association has decided that for the greater protection of the consumers of leather belting, it should establish and sell this commodity by specifications of thickness instead of weight, thereby discarding the old weight terminology of "ounces per square foot," which may be varied by the mere addition of weighting materials to the leather and does not necessarily always represent a differential in transmission values. This decision was reached after the association had canvassed all manufacturers of belting throughout the country, with the result that 81 replies were received, all voting for the change. Therefore, the movement can be considered as having the indorsement of the entire industry.

This is an interesting and progressive move for the purpose of establishing higher standards for a product that has been sold by weight for many years. Inasmuch as leather belting prices are based on thickness, the simplicity and common sense of this change has met with the instant approval of both manufacturers and users of leather belting. It simplifies and makes comparatively easy the checking of each piece of belting to see if the average thickness is as ordered.

The thickness specifications now in effect for first quality leather belting are as follows:

Medium Single—10/64 to 12/64 in.
Heavy Single—12/64 to 14/64 in.
Light Double—15/64 to 17/64 in.
Medium Double—18/64 to 20/64 in.
Heavy Double—21/64 to 23/64 in.

1. All thicknesses in this table are average thicknesses in inches, and should be determined by measuring 20 coils and dividing this value by the number of coils measured. In rolls of belting containing less than 20 coils the average thickness should be determined by measuring one-half of the total number of coils and dividing this value by the number of coils measured.

2. The classification of "Light Single" has been eliminated entirely.

3. Uniformity: No point in either single or double belting shall be more than 2/64 in. thicker or more than 2/64 in. thinner than the average thickness.

4. The second and third quality brands of each manufacturer bear the same relative thickness to the manufacturer's first quality grades as they did in the past under the old ounces per square foot specification.

These thicknesses are now in effect and should be used by all buyers of belting in wording their orders. Every order for single or double should specify the thickness on the order. If just the word "Light," "Medium," or "Heavy" appears on the order, each of these words now means the thickness as per the above table and *not the weight, as formerly.*

Where Liquid Coffee Stands Today

By G. L. WENDT
President, Liquid Coffee Products Co., New York, N. Y.

THE supply of coffee far exceeds the demand. Although wholesale value of coffee consumed in the United States is above $400,000,000 per year, the National Coffee Roasters' Association is gravely concerned by the fact that there has been no increase in consumption per person in the United States for the past 30 years. Consumption has only recently moved slightly above 12 lb. per person per year, about 1½ cups per day. In the face of this stagnation in the industry, Brazil has millions of bags of unsalable coffee on hand, has recently dumped a million or more bags into the sea, and is actually using coffee as fuel on its railroads.

Coffee roasters are attempting to meet the situation by propaganda and advertising, by improved packages, and by general adoption of the vacuum can, which improves quality of the product as delivered to the consumer. Nevertheless, it is probable that the obstacle to increased coffee consumption is not any lack of quality in the bean but is due to two other factors which are beyond control of the industry. It is common knowledge that quality of the beverage is far more dependent on method of preparing than on quality of bean. The unskilled cook can and does make an uninviting beverage from the best of coffees. The second factor is inconvenience, and time required for preparing the beverage.

These obstacles can be overcome by liquid coffee. It is, by definition, a concentrate which requires only addition of hot or cold water to make a cupful or an urnful. It is manufactured in scientifically controlled plants where beans can be selected by experts and where the best methods of extraction can be employed. Once the process has been perfected, a product of uniform excellence can be marketed, ending unskilled brewing of bad coffee and overcoming inconvenience.

The coffee trade has, for several years, made an active drive to prevent summer decrease in sales by intensive campaigns for popularizing iced coffee. These efforts have made little success, because of inherent obstacles. The temptation for restaurant or housewife is to use stale coffee for this purpose, coffee left over from yesterday, that has lost flavor and become rancid. The alternative, to pour fresh, hot coffee over ice, not only is wasteful but dilutes the beverage. The consumer may attempt to remedy this by making a brew double in strength; but this also defeats its purpose because attempting to extract more simply results in an increase of bitter tannic acids that ruin the beverage. Liquid coffee, on the other hand, is as soluble in ice water as boiling water.

There are thousands, perhaps hundreds of thousands of lunch counters and roadside stands serving no coffee because they cannot afford to install or maintain a coffee urn. Their problem is solved by liquid coffee. Add to this the use of liquid coffee on picnics and automobile tours, in camps and on yachts, railway dining cars, and air liners and the pressure to perfect liquid coffee is obvious.

The use of coffee as a flavor for other foods is not great. Here again the reasons are sound. Coffee brew is far too dilute to serve as a flavor for commercial purposes and cannot be marketed for this purpose without concentration—that is, without development of liquid coffee. At present each user must prepare his own coffee brew, a troublesome and expensive task lying outside his regular routine. The brew so prepared becomes stale on standing and must be used at once. Liquid coffee should provide the most popular of all flavor for use in ice cream, candies, bakery goods, soda fountain syrup, soft drinks, jellies, syrups, puddings and cake. There are applications as yet unsuspected, such as chewing gum, milk, buttermilk, malted milk, sandwich spreads, soups, medicines, tooth paste. There is involved a possible doubling of U. S. coffee consumption.

The question is, can liquid coffee be made equal in quality to fresh coffee? Nobody knows. Certainly it cannot now be maintained that its flavor is equal to the best coffee, freshly brewed from high-quality beans.

Instant coffees, soluble powdered coffees, made by evaporating coffee brew to dryness, have been on the market for many years, have achieved stability and financial success; but do not compete with the bean because volatile oils, an essential constituent of coffee flavor, are lost by exhaustive desiccation. The recent progress of liquid coffee has been due to abandonment of the idea of complete dryness, evaporation being carried only to the point where loss of flavor becomes serious.

Liquid coffee makers face two chief problems: loss of volatile, aromatic flavoring materials; development of bitter, rancid taste—staleness. Coffee roasters have attempted to solve these problems by means of vacuum packing, which retards both volatilization and oxidation (described by Thomas M. Rector in *Food Industries*, Sept., 1931). Since manufacture of liquid coffee is essentially evaporation of coffee brew to one-fifth or one-tenth original volume, loss of dissolved gases and highly volatile constituents is almost inevitable. Various processes now in use are designed to minimize this loss. Until this problem is completely solved, beverage made from liquid coffee will be lacking in aroma.

Development of rancidity is due to presence in the roasted bean of a little tasteless fat which, on exposure to oxygen, rapidly oxidizes and gives a bitter taste. Fat content varies in different grades and varieties of coffee and is profoundly affected by temperature and time of roasting. Since both brewing and concentration can be carried out on a large scale under conditions practically free from oxygen, development of rancidity becomes a problem only in the finished product; it must be prevented to produce a stable and marketable commodity. Two general methods are in use: Exclusion of oxygen from the package by use of a vacuum seal and recommendation to keep the opened bottle in a cool place; removal of the fat itself from the liquid coffee prior to bottling. Neither method can as yet be considered completely, uniformly successful. Use of inhibitors to prevent oxidation has not been successful because of limitations imposed by the fact that the solution is a food product consumed for its flavor.

However, enormous strides have been made in the solution of both problems. In spite of criticisms, liquid coffees now on the market are ample in quality to satisfy a large public and to build increasing demand. Remember that coffee experts are accustomed to finest shades of flavor and must grade beans completely undistinguishable to average consumers. While coffee experts usually are unwilling to admit that liquid coffee does or ever will taste like coffee, the public is already buying it in quantity.

Like other new industries, liquid coffee making is producing new by-products. One is extracted coffee grounds. While billions of pounds of

coffee grounds have been washed into the sewers annually, a few ounces at a time, this new industry is producing them in its plants on a tonnage basis. If the process has been properly conducted, they are of no value for flavor but contain other constituents whose possibilities have not yet been explored. The other byproduct is "coffee butter," the easily oxidized fat, for which no uses are now apparent.

Manufacture of liquid coffee is a simple process involving only standard procedures. Varieties and grades of coffee beans must be carefully selected, since there is a wide difference in suitability between them. Not only do usual considerations of aroma, body, acidity apply (volatile constituents, total soluble constituents, tannic acids); but degree of volatility under steam distillation is an important factor, also preferential solubility of various constituents under actual conditions of extraction. Best coffees for this purpose contain a high proportion of aromatic components, in a moderate volatility range. The most volatile constituents, responsible for the odor of cold, roasted beans, are lost in any case. Finally, the proportion of coffee butter in the bean is also important as a basis for selection.

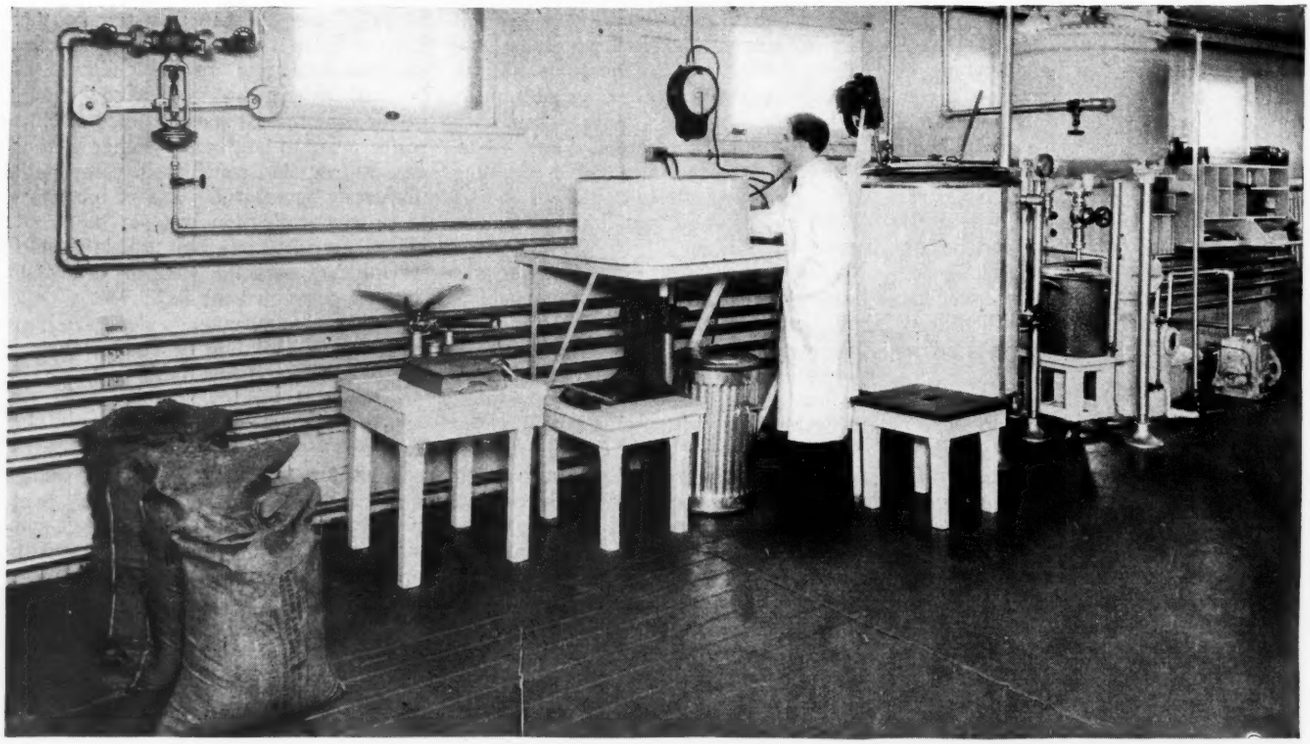
The first stage in the process is roasting, followed by grinding, neither differing essentially from the usual operation except that the roast must be so regulated for each variety of bean as to give maximum flavor with minimum rancidity. Grinding is determined by the method of extraction and filtration employed in the next stages of the process. The finer the grind, the more rapid the extraction, and the less time and temperature are needed for that process. However, very fine grounds introduce real difficulty, not only in filtration but in cleaning the vessels employed. To avoid fermentation, molds, and rancidity it is essential not only to prevent any trace of grounds from passing beyond the filter but also to see that all used grounds are thoroughly cleaned up and removed from the plant each day.

The first critical step in the process is extraction of ground beans. It is well known that the highest quality coffee beverage is made by the drip process, whereby a relatively small quantity of water is allowed to drip through fresh ground beans. Extraction takes place some degrees below boiling point and lasts about a minute. At the other extreme is the old rural habit of boiling ground coffee in water for many minutes, perhaps hours. These two processes produce entirely different extracts: the former rich in aromatic constituents, low in acids and color; the latter low in aroma (which has been boiled off), high in acidity, bitterness, color. Various constituents of the bean dissolve at different rates.

The manufacturer must adjust his procedure with utmost care. Obviously his product is not marketable at a price which will compete with coffee beans unless he extracts more from the bean than does the housewife using an ordinary percolator. In homes where economy is not important fifteen to twenty cups are obtained from each pound of beans. The average home will produce some thirty cups. Restaurants achieve forty or even fifty. On the other hand, an efficient large-scale extractor is capable of producing eighty or even a hundred cups from each pound, and the manufacturer of liquid coffee must pay the cost of his process by this superior extraction. Exhaustive extraction, however, produces a less desirable product. It is important to produce a brew of high concentration in order to avoid cost of evaporating unnecessary water and it is essential to extract from the beans all desirable constituents. But it is equally essential to avoid the extraction of too much color and unpalatable, bitter acids. The quality of water, the time and the temperature of extraction must therefore be carefully controlled for optimum results. Other things being equal, temperature and time must always be kept at a minimum because of their harmful effect on the flavor.

The problem consists of extraction of some 20 per cent of soluble materials from a powder which itself absorbs 160 per cent of its own weight in water. In other words, 100 lb. of ground coffee is just completely wetted by 20 gal. of water. Under ideal conditions the 20 gal. might dissolve all the soluble materials, amounting to at least 20 lb., and give a solution containing about 11 per cent dissolved materials. Actually, however, this cannot be attained, because this solution is firmly adsorbed by the coffee grounds. One process which has been put into commercial operation subjects the grounds to hydraulic pressure and is able to use the expressed liquor almost without evaporation as a concentrated coffee extract. It is, however, inefficient because of the large quantity of solution still remaining in the

The extractor and evaporator in an experimental liquid coffee plant



grounds. In spite of the cost of evaporation, larger volumes of water are therefore ordinarily used, but even with effective filtration every pound of grounds retains at least 1½ lb. of extract. Either a very large excess of water is used (about a gallon per pound of coffee) or multiple extraction is required. The resulting solution has a concentration of 3 to 6 per cent and represents a yield of 15 to 20 per cent of weight of coffee used. The amount of extraction is always limited by balancing cost of evaporating additional water against loss of values from incompletely extracted grounds.

Two types of extractors are in use. One is a simple steamheated tank in which coffee grounds and water are thoroughly agitated. When this is used it must be followed by filtration, difficult because the quantity of solids to be filtered is high in proportion to the solution and because coffee is seldom ground to uniform fineness but consists of a wide range of particle sizes with a large proportion of fine dust. This method has the disadvantage of requiring filtration and of requiring a large excess of water that must later be evaporated. It has the advantages of intimate contact between coffee and water which markedly reduces both time and temperature needed for the process.

The other method of extraction involves use of a percolator in which coffee is held on some form of filter bed and a relatively small quantity of water is circulated over and through it. This method practically eliminates the filtration problem, since coffee is never actually suspended in water. It also permits production of a concentrated solution with relatively little excess water. However, contact is poor, and channeling through the bed of coffee grounds is a serious difficulty. The result is that temperature must be considerably higher and percolation requires much time.

Either method of extraction must be followed by further filtration or by centrifugal clarifying. The difficulty of separating fine grounds is increased by the fact that these are always coated with a film of coffee butter which is exceedingly effective in clogging the pores of any filtering medium.

There remains the second vital stage of the process: namely, evaporation of the brew. Here again both time and temperature must be kept at a minimum. Excessive temperature and time produce three undesirable effects: evaporation of desirable flavors; oxidation of coffee butter; caramelization of sugars, giving what is recognized as a molasses taste. To reduce time and temperature, vacuum evaporators are universally employed, preferably of the fluid-film type.

The extent of evaporation differs in different processes and depends on marketing policy. Ordinary coffee beverage contains about 2 per cent dissolved materials. The strongest direct extract that can be made is about 11 per cent, more than five times as strong as the ordinary coffee brew. This could be marketed directly as a liquid coffee without any evaporation, provided it could be marketed or dispensed in such a form that 1 oz. is used to a 5-oz. cupful. The trade demands a more concentrated product, however, and it is not economical in practice to obtain a brew which actually contains 11 per cent.

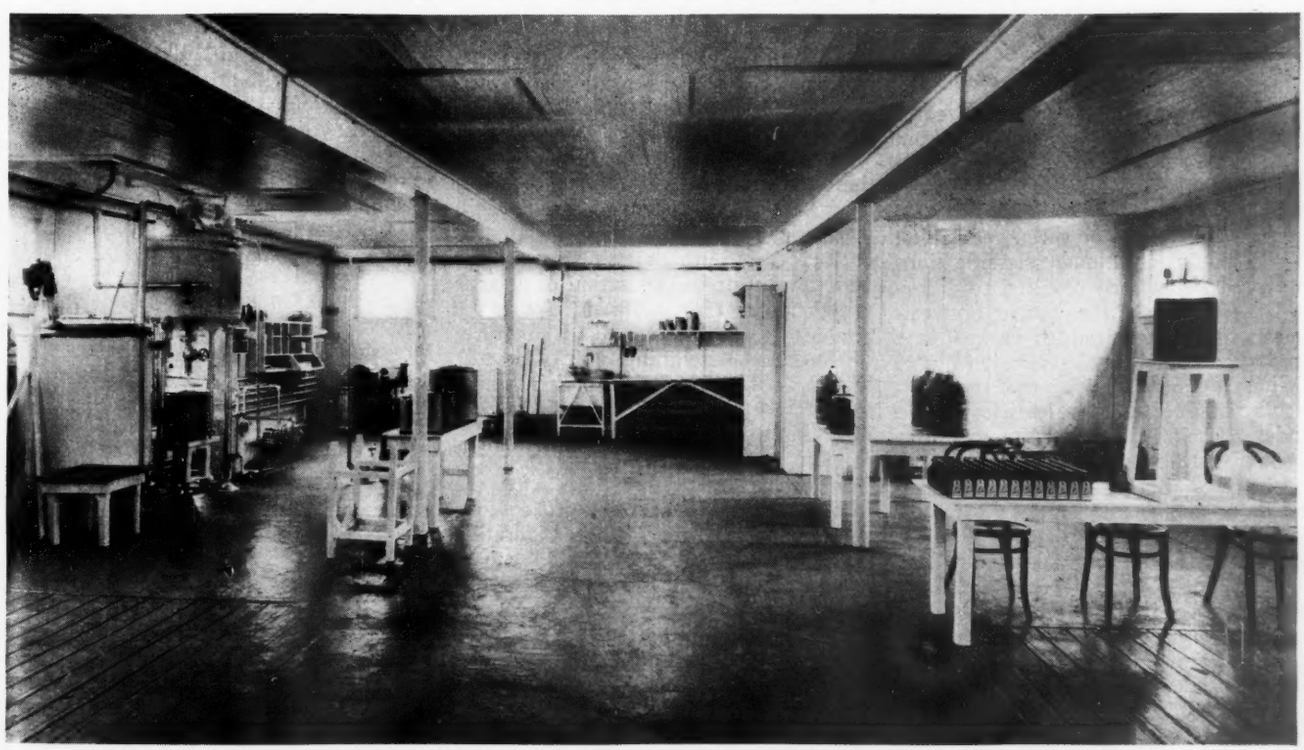
The extract actually obtained may vary from 2.5 to 6 per cent and the concentration after evaporation varies from 20 to 50 per cent. The limit is reached at approximately 70 per cent, because further concentration results in a marked rise in temperature in the evaporator with serious loss of aroma and caramelization.

The evaporation itself involves no unusual features except necessity for a reliable high-capacity vacuum pump to maintain a vacuum at all times above 27 in. Under this vacuum the temperature of the solution in the evaporator is maintained below 115 deg. F. and undesirable reactions are avoided. Once proper concentration has been achieved, the liquid coffee may be drawn off from the evaporator and is ready for cooling and bottling.

One process now in commercial operation concentrates the brew by fractional freezing instead of by evaporation. This unquestionably avoids deterioration of product due to prolonged heating and succeeds in retaining aroma otherwise lost by evaporation. The problems of efficient and economical multiple freezings are also serious, however, and the process is expensive.

In general, equipment used in the industry is still of batch type. No satisfactory extractors or evaporators of continuous type have as yet been developed, but their introduction is only a matter of time. Both extraction and evaporation could be more efficiently and economically conducted in continuous units, but development of such equipment implies secure establishment of liquid coffee and sales at least as continuous and reliable as the equipment.

Experimental plant of Lido Liquid Coffee, Ltd., Victoriaville, P. Q., Canada



Developing Equipment for Quick-Freezing and Chilling

By CLARENCE W. VOGT
Vice-President, Vogt Processes, Inc., Louisville, Ky.

QUICK-CHILLING and quick-freezing of food products has in the main involved the forcing or stretching of available equipment to greater extremes, the major change involving lower temperatures. Five years ago, temperatures lower than —25 deg. F. were considered available only for regenerative processes and for the laboratory. During the last five years, the manufacturers of food products have been convinced of the desirability of utilizing temperatures such as —50 deg. F., and of the use (for transportation, mainly) of solidified CO_2, the temperature of which is approximately —109 deg. F. But, just as the advancement in transportation was not limited to improvement in the breed of draft horses, advancement in the art of chilling and freezing food products is not limited to the utilization of lower and usually more costly temperatures.

For the purpose of classification, food products may be divided into two broad classes:

1. Those which are plastic and/or at least semi-fluid at some stage of their processing and usually whose heterogeneous constituents are to be evenly mixed into a substantially homogeneous product.

2. Those whose form or nature does not require or will not permit mixing or milling or blending of the constituents.

Examples of class 1 are: lard compounds; margarine; eggs (removed from shells); fruit juices; ice cream; sherbet; ices; cream. Examples of class 2 are: fillets of fish; meats; whole fruit (or fruit slices); whole or sliced vegetables. While many additional classifications and subdivisions are required to differentiate completely the nature of treatment which is required for various food products, the above classification makes obvious a generic limitation of the treatments possible for those articles falling under classification 2. Not quite so obvious until second thought, however, is the fact that many of the articles listed as examples under class 1 may be processed to such a degree that for further treatment they may fall within class 2. For instance, an ice cream mixture may be frozen under concurrent agitation to such a firm state that additional mechanical agitation or mulling of the mass causes an impairment of its homogeneity and, therefore, additional freezing of such a product to a more solid state should be carried on without agitation.

Products coming under classification 1 may be treated as fluids, at least through some stage or phase of their treatment. In this stage they may be exposed to a heating or cooling medium and removed from such exposure with great rapidity. One thinks of a fluid flowing over a heating surface—the fluid nearest the surface dragging along more slowly than the portion of the fluid farther from the heating surface, especially if the heating surface is a solid wall such as a tube. As the difference between heating and cooling treatment is mainly a matter of direction of flow (*i.e.*, heat always flows from the object at the higher heat level to the object at the lower heat level), we will hereafter refer to the treatment as cooling (chilling or freezing). In terms of cooling, then, one thinks of a fluid flowing over a cooling surface, insulated from the surface by a slowly moving or stagnant layer, the fluid body being cooled only by its mixture with this layer as it moves or is pulled away from the surface and mixed into the fluid body.

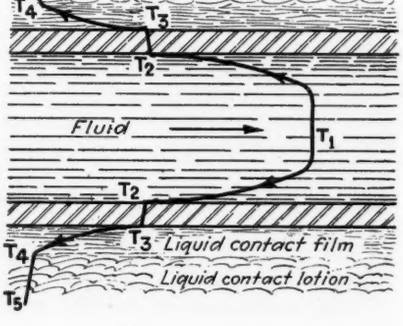
In Fig. 1, it will be seen that there is a small temperature gradient between T_3 and T_2, and much larger gradients between T_1 and T_2 and between T_3 and T_4. The obvious means for reducing this total gradient is to remove the films by means of turbulent flow or some mechanical means. With material such as ice cream (which also requires the whipping in or incorporation of a large proportion of air), agitation also is desirable. This brought about the form of freezing or chilling unit (Fig. 2) known as the "batch freezer," in which a relatively large mass of liquid is rapidly agitated while subjected to refrigeration, and the film removed from the freezing surface by scrapers. After the material has been partially frozen to a semi-fluid condition, the refrigeration effect is reduced or removed and the mass usually is further rapidly agitated. Since the vessel was not originally filled, additional air is whipped into the semi-frozen mass, which is then dumped or "drawn" into cans or hoppers.

Another form of chilling or freezing apparatus which is used (Fig. 3) involves the spreading of a thin liquid film over the outside surface of a revolving drum, and the subsequent removal of the chilled material in the form of thin sheets or membranes, which are collected in a trough where this material is whipped (or rapidly stirred) to blend the particles and, usually, to incorporate air for whitening the product. It will be noted that this method of chilling lends itself to rapid crystallizing of the film and the advancement of the material in continuous flow. The efficiency of the roll type of apparatus (that is, the B.t.u. removed per square foot per degree difference in temperature per unit of time) usually is found to be less than that of the type of apparatus shown in Fig. 2, due to the insulating effect of the relatively fixed film.

The advantages of rapidity of crystallization and uniformity of treatment over that obtained by the batch apparatus, however, caused the adoption of the apparatus (shown in Fig. 3) for the chilling of lard compounds and margarine, although some margarine plants still use the "wet system" (*i.e.*, chilling the oil and milk emulsion by direct contact with a stream of ice water, some of which remains in the product but most of which drains off or is worked out of the mass of "set" or solidified emulsion).

Although repeated attempts have been made to freeze liquid eggs by the use of the apparatus shown in Figs. 2 and 3,

Fig. 1—Relative resistances to heat flow through metal wall and liquid contact films



this was never found to be successful, principally because the incorporation of air in the partly frozen product caused the oxidation of the ingredients and the undue beating or mulling caused a breaking down of the cellular structure. Both effects cause a reduction in the swelling of cake batter during baking, obtained by the use of eggs in the batter.

While quick-chilling or freezing of a product is highly desirable, this quick-chilling, to be most effective, must be carried out under conditions and to a degree favorable to the formation of the greatest number of crystals, coupled, where possible with the comminution of such crystals during or after formation. Obviously in the treatment of products such as fish or meat steaks, which may not be mulled or agitated during chilling, the principal relief from large crystal formation during the freezing lies in reducing the chilling time to a minimum by the intimate and effective application of refrigeration. However, with products such as those referred to under classification 1, advantage may be taken of the thin film application in the primary processing. All the evidence available points to one incontrovertible conclusion, namely: The most effective type of refrigeration should be applied until the product has passed the "critical point" of crystal formation. Whenever possible, during the period of chilling through the crystallizing stage and until the mass is solidified to such degree as to prevent further appreciable growth of formed or forming crystals, these crystal centers or seeds or nuclei should be broken up and distributed uniformly throughout the mass. After the mass has reached this state of solidification—its "critical point"—provided the chilling has been sufficiently rapid and/or the dispersion of nuclei sufficiently effective, further growth of the formed crystals is not sufficient to be detectable nor is there any appreciable merging or clustering of these crystals into relatively large groups.

The atmospheric or batch type of concurrent freezing and agitating apparatus (Fig. 2) is not sufficient in itself to carry this processing to that degree, the reasons being principally the low surface to volume relationship herein and that such apparatus is designed to operate at atmospheric pressure and a product processed to the necessary degree of stiffness cannot be discharged satisfactorily. However, if the product discharged from the apparatus of Fig. 2 is further refrigerated in a comparatively thin layer (see Fig. 4), the product leaving the latter is sufficiently processed to insure stability and freedom from crystals of noticeable or objectionable size. The layer may be continuously advanced through a hardening chamber, and the refrigerating, to produce final solidification, may be effected by exposure to the very cold air in such chamber or by depositing on chilling surfaces, or both. If the hardening be effected on such freezing surfaces, the hardened material may be readily collected in the form of bars or ribbons or flakes, and the latter formed into the desired sectional, columnar, or other forms.

As an example, ice cream containing the usual ingredients, including 14 to 15 per cent sucrose, may be partially frozen and whipped, with the incorporation of air, and discharged from the batch freezer at a temperature of approximately 25 to 26 deg. F. (lower if the mixture contains a higher sugar content), then spread out and continuously advanced through the hardening chamber (Fig. 4), where, due to its relatively thin section, it is rapidly passed through the critical point or stage and discharged from such chamber at approximately 10 deg. F. for packaging and delivery or storage. If the hardening is done on a refrigerated surface, the material may be readily scraped therefrom and formed into bricks of the desired shape and size. However, if the material leaving the batch unit (Fig. 2) is delivered into large containers, an hour or more of exposure to extremely low temperature will be required for the material to pass through the "critical stage" with a consequent increase in crystal growth and impairment of structure of the resultant product.

It is not generally known that a temperature of 10 deg. F. is sufficiently cold to prevent crystal growth in ice cream. This lack of knowledge is due to experience confined to hardening a relatively soft product in bulk. Provided the chilling through the freezing zone has been sufficiently rapid and the dispersion of nuclei sufficiently effective, the product

Fig. 3—Chilling roll or drum type of apparatus in which a thin film on the outside of the drum is cooled by giving up heat to the cooling medium on the inside

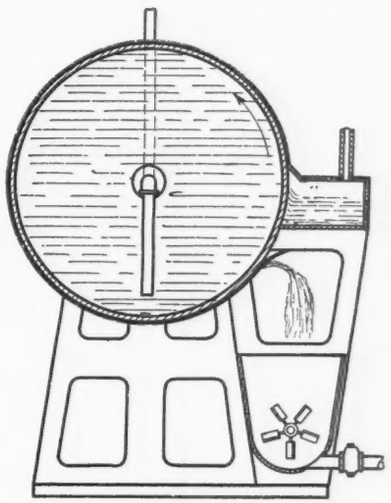


Fig. 4—A "batch" freezer combined with a device for spreading out the product in a thin layer and rapidly cooling it below the "critical" point. Protected by U. S. patents Nos. 1,733,740 and 1,742,171 and other U. S. and foreign patents allowed and pending

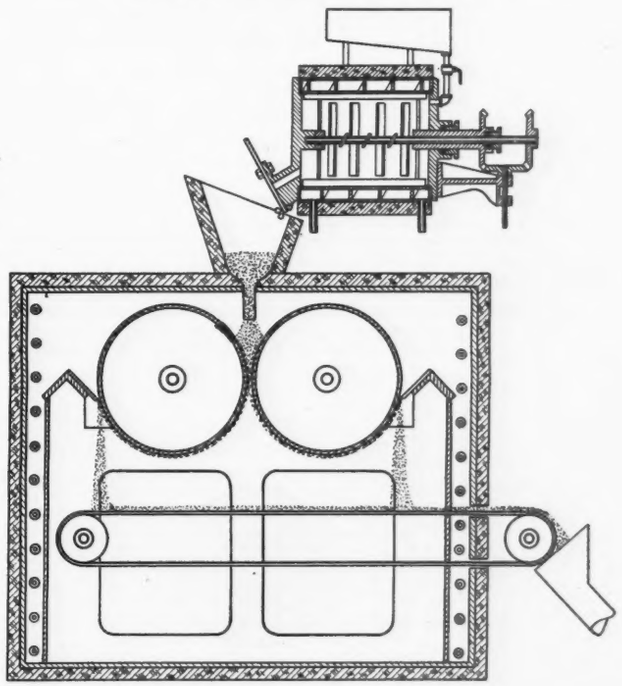
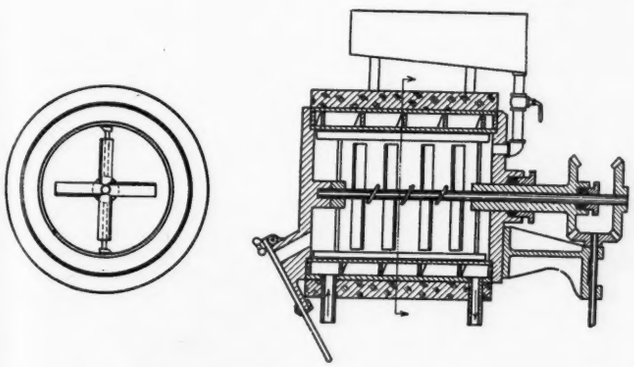


Fig. 2 — Freezing apparatus of the "batch" type such as is used for ice cream and similar materials



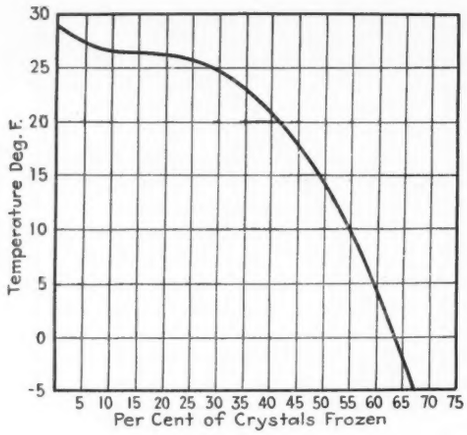


Fig. 5—Per cent of total water frozen in an ice cream mix at different temperatures

has passed through this critical zone before reaching this temperature (10 deg. F.) and the need for further rapid temperature reduction has ceased. In fact, the need for any temperature reduction below 10 deg. F. (provided the mix is of the usual sugar content) arises from some cause or condition other than quality consideration. In Fig. 5 is shown the percentage of water frozen at the different temperatures, the material being an ice cream containing the usual ingredients and approximately 14 per cent sugar. It will be seen that at 26 deg. F. only 20 per cent of the water is frozen, whereas at 10 deg. F. (the dispersing temperature), 55 per cent of the water is frozen, and at 0 deg. F., 63 per cent (or 8 per cent more water) is frozen. This last 8 per cent of freezing must be "undone" before the product can be conveniently "dished" or "spooned."

The underlying reason for the development of the apparatus and methods of Fig. 4 was to accomplish the rapid (and economical) freezing (crystallization) of ice cream and other similar products through the zone of maximum crystal formation (or "critical stage").

The operation of the first pilot plant embodying this principle showed marked improvement in the product and proved, among other things, that the small crystals had actually been secured. These operations indicated that with many kindred products the crystallization could be effected even more rapidly by spraying a precooled mixture through a cooled atmosphere (which, if desired, could be composed of an inert gas) and permitting the atomized particles to impinge against a refrigerated surface where the crystallization of the mist was completed to the desired point. Accordingly, several forms of commercial size apparatus were constructed to test out such methods. One form is indicated in Fig. 6, in which the atomization of the prechilled mixture is effected in a revolving chamber, closed to the outside atmosphere, with means for removing the congealed material and depositing it into suitable containers.

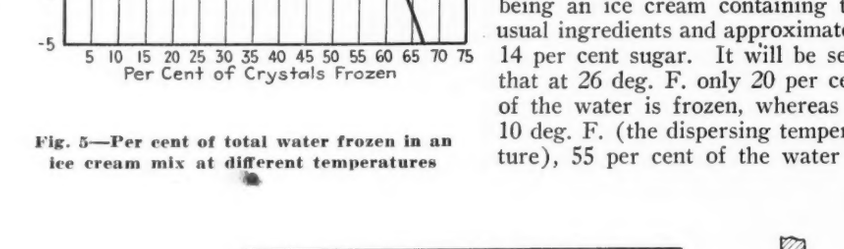


Fig. 6—Apparatus developed for freezing a precooled mixture by spraying through a cooled atmosphere and impinging upon a refrigerated surface. Protected by U. S. patents Nos. 1,791,773 and 1,791,774 and other U. S. and foreign patents allowed and pending

As would be expected, the operation of these various process steps indicated several important facts, among them being: (*a*) that it was advantageous in some cases to bond the crystallized beads before molding them to the desired form; (*b*) that a large amount of the heat could be removed from the liquid before atomization, thereby materially increasing the capacity of the secondary freezing or chilling apparatus and also carrying the product as rapidly as possible through the critical stage.

One form of apparatus carrying out the above principles included a hydraulic pump built for very high operating pressures and identical in many respects to the well-known homogenizers and viscolizers as used in the ice cream industry and, in order to carry the prefreezing to any desired degree, a freezer was constructed of suitable size and strength to operate under any desired high pressure. The unit was equipped with a novel type of agitation mechanism which maintained an efficient transfer rate even with materials such as vegetable oils, ice cream mixes, eggs, and other materials of low heat conductive coefficients.

The operation and tests of the system

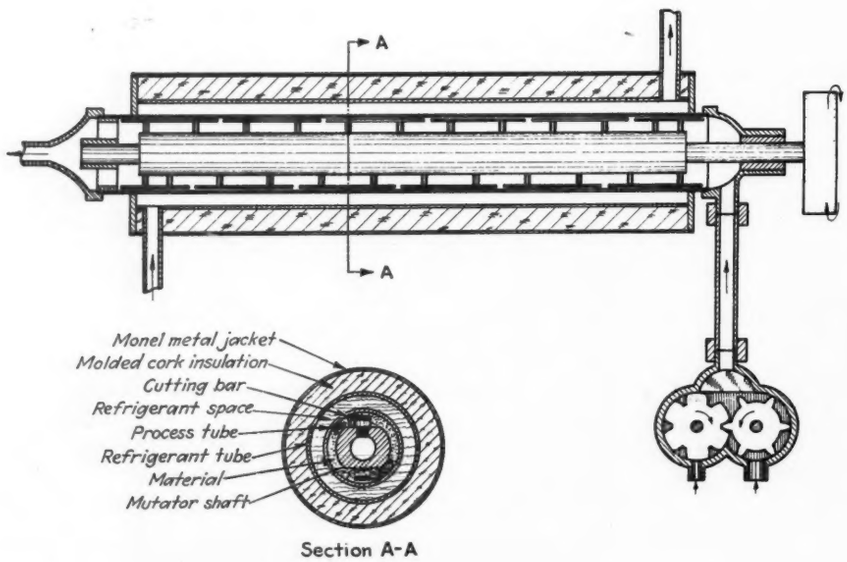


Fig. 7—Freezer designed to operate under high pressure. Protected by U. S. patents Nos. 1,783,864, 1,783,865, 1,783,866, and 1,783,867, and other U. S. and foreign patents allowed and pending

indicated that the precooler and freezer (Fig. 7) was not only very efficient from a heat transfer standpoint; but also that, by its employment, products such as eggs, lard substitutes, ice cream mixes and other commodities could be processed to a degree and at a speed theretofore unapproached; and that by closing the circuit the product so processed could be delivered free of air, where this was desired; and that where it was desirable to incorporate or whip in a gaseous fluid, this could be accomplished automatically and in exactly the desired proportion.

Heat may be withdrawn from a fluid through a transfer surface at a rate proportional to that at which particles and molecules pass backward and forward with relation to the surface to any given depth within the fluid. By the application of this principle it will be seen that the rate of heat withdrawal should be the greatest when the depth or thickness of the fluid mass is limited to one molecule of the fluid; *i.e.*, the highest theoretical surface-to-volume ratio. However, practical limitations, as usual, call for a compromise. The obvious need for a compromise is the fact that, especially in connection with the crystallization and the formation of a relatively liquid body into a semi-solid body, tremendous pressures are required to extrude semi-solids of such practically immeasurable cross-sectional area. However, in the low surface-to-volume relationship, as found in all of the commercial apparatus known as batch freezers, apparently the potential benefits of this principle were altogether disregarded, as the use of such equipment required excessive "passing of particles backward and forward" into the depths of the fluid mass.

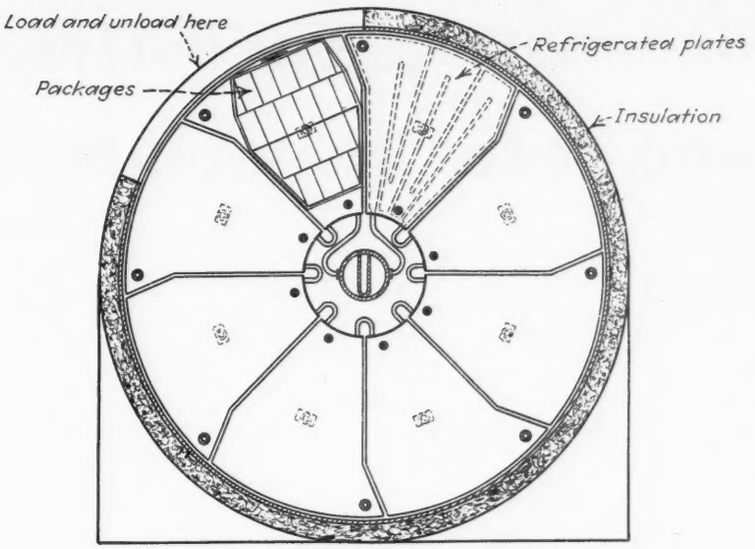


Fig. 8—Apparatus for chilling products, such as packages, which cannot be agitated during processing. Patent pending

By referring to Fig. 7, it will be seen that the advantage of the thin layer or thin film principle of the Fig. 3 apparatus is present, as is also the advantage of the effective film removal means of the Fig. 2 apparatus. It may be pointed out that in the operation of cooling fluid or semi-fluid masses the agitation of the mass causes its heating, and therefore the net amount of heat removed from the mass is equal to the total heat removed minus the frictional heat added. It is thus evident that the elimination of excessive or prolonged agitation, with the inevitable production of undesirable heat, is of much greater importance—from the standpoint of efficiency alone—when the operation involves lowering the temperature of the mass than when the operation involves raising the temperature.

From the non-fluid or plastic stage or state to the hardened or relatively solid state the types of equipment for commodities under classification 2 may, in most cases, be utilized also for the commodities coming under classification 1. Also the type shown in Fig. 4 is admirably suited, as are those shown in Figs. 8 and 9 and, conversely the class 2 commodities can in many, if not all, cases be most effectively treated by the methods and apparatus designated by these figures. The trend toward individual consumer packages and away from bulk materials, such as sides of beef, 5-gal. cans of ice cream, and firkins of butter—primarily because such packaging can best be performed by the producers or packers of such products—has been anticipated and has been the dominant urge in the development of these various forms of equipment and apparatus.

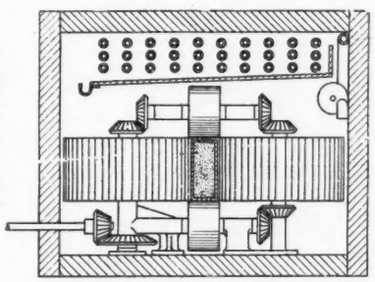
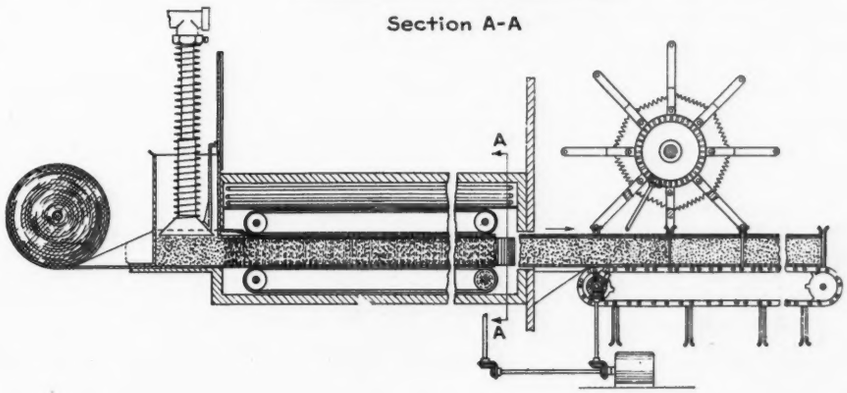


Fig. 9—Another form of apparatus for chilling products which cannot be agitated during processing. Protected by U. S. patents Nos. 1,810,740, 1,810,863, and 1,810,864, and other patents pending



Forecasting Yardsticks for Food Raw Materials

Indexes of production, stocks, imports, and consumption as gages of prospective demand or price in food manufacture

By R. S. McBRIDE
Assistant Editor, Food Industries

YARDSTICKS to measure the trends in food manufacture are always welcome. But yardsticks, to be useful, must be calibrated in order to give accurate indications of the trends measured. Such yardsticks are not conveniently available for all of the food industries; but, fortunately, there are available many more than are now being used. And still more fortunately, the establishment of additional indexes appropriately planned gives promise of still greater aid.

In gaging industrial trends which affect our industries one may concern himself with the prospective price, the prospective demand, or the prospective manufacturing activity of his own, his competitors', or his contemporaries' business. The trend factor measured, of course, depends upon the purpose of the seeker. If he is a buyer of goods he is most concerned with price considerations. If he is a manufacturer, he is most likely to be concerned with the scheduling of future production. If he is a sales manager, his concern is with future market demand and prospective price obtainable. One would think with these clear relationships outlined it would not be difficult to determine just what was the variable requiring attention with respect to each function or each commodity. Unfortunately, the matter is far more complex, sometimes seemingly almost hopeless.

Some commodities, like coffee, are comparatively free from inter-commodity competition. How much we drink of this beverage seems to depend very little upon our habits with reference to tea, milk, cocoa, or other somewhat competitive beverages. Some say, and they seem to have some ground for their argument, that only change in habits with reference to drinking beer makes any material difference in man's habits of coffee drinking. It is evident, however, that the quantity of coffee consumed does vary widely for other than commodity competition reasons. Among the two outstanding factors influencing our use are the prevailing market price at retail and the general level of buying power.

This matter of forecasting coffee re-

Some of the Food Indexes Available Monthly in "Survey of Current Business,"

General		
Production index:		
Food products (Fed. Res. Bd.)	rel. to 1923-5	89
Food and kindred products (elect. energy consumed)	rel. to 1923-5	127.2
Stocks, manufactured foodstuffs	rel. to 1923-5	85.3
Stocks, raw foodstuffs	rel. to 1923-5	109.6
Candy		
Sales by manufacturers	$1,000	16,870
Cocoa		
Shipments from Gold and Nigerian Coasts, Africa	long tons	52,105
Imports	long tons	16,641
Spot price, Accra, New York	dols. per lb.	
Coffee		
Clearances:		
Total, Brazil for United States	1,000 bags	823
Total, Brazil for world	1,000 bags	1,270
Imports	1,000 bags	1,220
Price Rio No.7, Brazil grades	dols. per lb.	.071
Receipts, total Brazil	1,000 bags	1,580
Visible supply:		
United States	1,000 bags	1,359
World	1,000 bags	6,244
Dairy Products		
Butter		
Apparent consumption	1,000 lb.	157,136
Cold-storage holdings, creamery, end of month	1,000 lb.	22,527
Production (factory)	1,000 lb.	119,324
Receipts, 5 markets	1,000 lb.	48,895
Wholesale price, New York	dols. per lb.	.24
Cheese		
Total, all varieties:		
Apparent consumption	1,000 lb.	38,014
Cold-storage holdings, end of month	1,000 lb.	65,707
Exports, Canada	1,000 lb.	752
Exports, United States	1,000 lb.	157
Imports, United States	1,000 lb.	3,739
Receipts, 5 markets	1,000 lb.	11,361
Production (factory)	1,000 lb.	26,860
American whole milk:		
Cold-storage holdings, end of month	1,000 lb.	49,388
Wholesale price, New York	dols. per lb.	.14
Eggs		
Cold-storage holdings, end of month:		
Case	1,000 cases	664
Frozen	1,000 lb.	72,361
Receipts, 5 markets	1,000 cases	936
Milk		
Condensed milk:		
Exports	1,000 lb.	2,310
Total stocks, manufacturers, end of month—		
Case goods	1,000 lb.	9,145
Bulk goods	1,000 lb.	8,268
Wholesale price, New York	dols per case	475
Evaporated milk:		
Exports	1,000 lb.	4,502
Manufacturers' stocks, end of month—		
Total case goods	1,000 lb.	127,883
Wholesale price, New York	dols. per case	2.98
Fluid milk:		
Consumption in mfr. of oleomargarine	1,000 lb.	5,106
Production, Minneapolis and St. Paul	1,000 lb.	.....
Receipts—		
Boston, including cream	1,000 qt.	.....
Greater New York	1,000 qt.	.....
Powdered milk:		
Exports	1,000 lb.	261
Manufacturers' stocks, end of month	1,000 lb.	25,492
Net new orders	1,000 lb.	7,971
Production, condensed and evaporated milk	1,000 lb.	131,118
Exports, condensed and evaporated milk	1,000 lb.	6,812
Fish		
Canned salmon:		
Exports, Canada	cases	87,338
Shipments, United States, thous. of cases		.....
Cold-storage holdings, 15th of month	1,000 lb.	63,997
Total catch, principal ports	1,000 lb.	15,749
Fruits and Vegetables		
Export value, fruits and preparations	$1,000	7,414
Apples:		
Car-lot shipment	carloads	8,149
Cold-storage holdings, end of month	1,000 bbl.	.....
Production, crop estimate	1,000 bu.	.....
Citrus fruits, car-lot shipments	carloads	12,270
Onions, car-lot shipments	carloads	2,120
Potatoes, car-lot shipments	carloads	17,465
Production, crop estimate	1,000 bu.	.....
Grains		
Total grain exports, including flour	1,000 bu.	8,411
Barley		
Exports	1,000 bu.	129
Price, No. 2, Minneapolis	dols. per bu.	.51
Production, crop estimate	1,000 bu.	.....
Receipts, principal markets	1,000 bu.	.....
Visible supply, end of month	1,000 bu.	4,030
Corn		
Exports, including meal	1,000 bu.	177
Grindings (starch, glucose)	1,000 bu.	.....
Prices:		
No. 3, yellow, Chicago	dols. per bu.	.37
No. 3, yellow, Kansas City	dols. per bu.	.39
No. 3, white, Chicago	dols. per bu.	.37
Production crop estimate	1,000 bu.	.....
Receipts	1,000 bu.	10,421
Shipments	1,000 bu.	3,603
Visible supply, end of month	1,000 bu.	14,736
Hay		
Receipts	number of cars	.....
Production, crop estimate	1,000 tons	.....
Oats		
Exports, including meal	1,000 bu.	133
Grindings, Canada	1,000 bu.	.....
Price No. 3, white, Chicago	dols. per bu.	.25
Production, crop estimate	1,000 bu.	.....
Production, oatmeal, and rolled oats, Canada	1,000 lb.	.....
Receipts, principal markets	1,000 bu.	4,545
Visible supply, end of month	1,000 bu.	16,846
Rice		
Exports	pockets (100 lb.)	148,002
Imports	pockets (100 lb.)	32,111
Production, crop estimate	1,000 bu.	.....
Shipments:		
Total from mills	thous. of pockets (100 lb.)	720
New Orleans	pockets (100 lb.)	57,264
Southern paddy, receipts at mills	1,000 bbl.	569
Stocks, end of month	1,000 pockets (100 lb.)	1,906

quirements is an interesting one, even for those who have nothing to do with coffee roasting or marketing. The factors which enter are typical of many food problems. They are, therefore, worth some attention here. Particularly is it worth while to notice just what are the available data by which the coffee trade can forecast its activities.

Visible world stocks of coffee are regularly estimated and published by several reliable agencies. Not only is the visible supply in the United States important but also the visible supply of the rest of the world, notably that in the major producing countries of Latin America. And next there is that still more comprehensive figure of "potential supply" for any crop year, a figure made up by combining the carry-over from the preceding crop year with the known or estimated current crop. This potential supply figure was formerly not far from 25,000,000 bags, and at that time the apparent consumption of coffee throughout the world was from 18,000,000 to 20,000,000 bags. A typical carry-over was then 5,000,000 bags, or, in the early post-war days, 8,000,000 bags. The relationship thus existing a decade or more ago was comparatively simple. The consumption was, roughly, 75 to 80 per cent of potential supply, and carry-over was from 25 to 30 per cent of annual world consumption.

However, the attractive profit margin in coffee induced new plantings. Crop increases naturally followed. Even vigorous governmental control in Latin America, notably in Brazil, failed to restrain the flood. Recent figures indicate carry-overs of 25,000,000 to 30,000,000 bags (three to six times those of a decade earlier), potential supplies at 50,000,000 to 55,000,000 bags (double the supplies of the earlier '20s); and meantime the world consumption stimulated by low price and by partial restoration of European buying power has increased by only a third to approximately 25,000,000 bags. The result? It is obvious: price collapse, ineffective market control, financial distress, trouble generally for producers and traders.

Average prices at wholesale, typically 20 to 25c. in years of normal relationship, have receded to depression levels of 8 to 10c. Many widely used grades sell for 5 or 6c. Indexes of price, indexes forecasting trend in consumption, all indexes failed to gage the magnitude of the change which has taken place. The distortion of economic conditions affecting general buying power entered to magnify changes which in themselves would have been serious. And the result has been calamity. Even with a one-third increase in estimated world consumption within a decade, the gross value of the sales of coffee at retail are from 25 to 30 per cent less today than a decade ago. And the profit margin, not only of producers but also of marketers, is adversely affected by this change, not only per pound but also per year.

In land surveying it is customary to use a tape of "invar" steel, so named because it is substantially invariable in length with change of temperature. We have no such measuring stick of coffee or other markets or materials, invariable with respect to standards of living, general commodity price levels, or other major economic influences of manufacture and trade. The coffee situation just described proves this quite clearly even for a simple case. It is even more true in measuring the more complex relations of other food industries.

Flour millers not many months ago had clear proof of the fallibility of single yardsticks. Many of the leading millers were accustomed to gage their operations and modify their price according to the advance orders which they received. In the period referred to, for no clearly evident reason, there was a rapid increase in the hand-to-mouth buying practice of industrial flour users. Each miller suddenly found himself with order books containing commitments by his customers for only half the customary quantity of "forward orders." Unfortunately, many millers misinterpreted this gage of prospective business. They rushed panic-stricken

For March, 1932, Published by the U. S. Department of Commerce

Rye		
Exports, including flour	1,000 bu.	10
Price No. 2, Minneapolis	dols. per bu.	.46
Production, crop estimate	1,000 bu.	.....
Receipts, principal markets	1,000 bu.	.....
Visible supply, end of month	1,000 bu.	.....
Wheat		
Exports:		
Canada, including wheat flour	1,000 bu.	10,966
United States—		
Wheat only	1,000 bu.	4 074
Including wheat flour	1,000 bu.	7,962
Export value of wheat and flour	$1,000	5,263
Stocks, held by mills (quarterly)	1,000 bu.	.....
Prices:		
No. 1, northern spring, Minneapolis	dols. per bu.	.75
No. 2, red winter, St. Louis	dols. per bu.	.57
No. 2, hard winter Kansas City	dols. per bu.	.53
Production, crop estimate:		
Total	1,000 bu.	.....
Winter wheat	1,000 bu.	.....
Spring wheat	1,000 bu.	.....
Receipts	1,000 bu.	17,072
Shipments	1,000 bu.	11,005
Visible supply, end of month:		
Canada	1,000 bu.	187,974
United States	1,000 bu.	211,873
Wheat Flour		
Consumption (computed)	1,000 bbl.	.....
Exports:		
Canada	1,000 bbl.	332
United States	1,000 bbl.	864
Grindings of wheat:		
Canada	1,000 bu.	.....
United States	1,000 bu.	37,283
Prices, wholesale:		
Standard patents, Minneapolis	dols. per bbl.	4.59
Winter, straights, Kansas City	dols. per bbl.	3.40
Production:		
Canada	1,000 bbl.	.....
United States—		
Actual (Census)	1,000 bbl.	8,182
Prorated (Russells')	1,000 bbl.	.....
Capacity	per cent	52
Grain offal	1,000 lb.	646,096
Stocks:		
All positions (computed) end of month	1,000 bbl.	.....
Held by mills (quarterly)	1,000 bbl.	.....

Meats		
Export value, meats and fats	$1,000	6,117
Cattle and Beef		
Beef products:		
Apparent consumption	1,000 lb.	380,143
Cold-storage holdings, end of month	1,000 lb.	51,221
Exports	1,000 lb.	1,202
Production, inspected	1,000 lb.	377,068
Cattle movements, primary markets:		
Local slaughter	thousands	876
Receipts	thousands	1,376
Shipments, stocker and feeder	thousands	130
Shipments, total	thousands	478
Prices:		
Beef, fresh, carcass, good native steers, Chicago	dols. per lb.	.145
Beef, fresh, carcass, steers, New York	dols. per lb.	.168
Cattle, corn fed, Chicago	dols. per 100 lb.	8.97
Hogs and Pork		
Hog movements, primary markets:		
Local slaughter	thousands	2,707
Receipts	thousands	4,218
Shipments, stocker and feeder	thousands	35
Shipments, total	thousands	1,510
Lard (included in pork products):		
Cold-storage holdings, end of month	1,000 lb.	78,538
Exports	1,000 lb.	59,854
Production	1,000 lb.	171,331
Pork production:		
Apparent consumption	1,000 lb.	653,261
Cold-storage holdings, end of month—		
Total	1,000 lb.	753,529
Fresh and cured	1,000 lb.	674,378
Exports—		
Total	1,000 lb.	69,020
Other products than lard	1,000 lb.	9,166
Production, inspected	1,000 lb.	860,315
Prices:		
Hams, smoked, Chicago	dols. per lb.	.138
Hogs, heavy, Chicago	dols. per 100 lb.	3.91
Lard, prime contract, New York	dols. per lb.	.055
Sheep and Lambs		
Lamb and mutton:		
Apparent consumption	1,000 lb.	64,255
Cold-storage holdings, end of month	1,000 lb.	1,968
Production, inspected	1,000 lb.	63,934
Prices—		
Sheep, ewes, Chicago	dols. per 100 lb.	2.06
Sheep, lambs, Chicago	dols. per 100 lb.	5.09
Sheep movements, primary markets:		
Local slaughter	thousands	1,381
Receipts	thousands	2,363
Shipments, stocker and feeder	thousands	124
Shipments, total	thousands	988
Miscellaneous meats:		
Cold-storage holdings, end of month	1,000 lb.	69,261
Total meats:		
Apparent consumption	1,000,000 lb.	1,098
Cold-storage holdings, end of month	1,000,000 lb.	876
Production	1,000,000 lb.	1,301
Poultry		
Cold-storage holdings, end of month	1,000 lb.	111,576
Receipts at 5 markets	1,000 lb.	25,197
Prices		
Retail food (Dept. of Labor)	rel. to 1913	109
Wholesale food	rel. to 1926	64.7
Sugar		
Cuban movement (raw):		
Exports	long tons	18,242
Receipts at Cuban ports	long tons	88,595
Stocks, end of month	thous. of long tons	75
Prices:		
Retail coverage, 51 cities	rel. to 1913	.98
Retail, granulated, New York	dols. per lb.	.051
Wholesale granulated, New York	dols. per lb.	.041
Raw:		
Imports—		
From Hawaii and Porto Rico	long tons	93,141
From foreign countries	long tons	196,150
Meltings, 8 ports	long tons	246,324
Stocks at refineries, end of month	long tons	182,257
Refined:		
Exports, including maple	long tons	3,365
Shipments, 2 ports	long tons	44,745
Stocks, 2 ports	long tons	32,239
Tea		
Imports	1,000 lb.	10,028
Price, Formosa, fine, New York	dols. per lb.	.215

NOTE: The large number of indexes given are but a small part of those available from government and trade sources with reference to outstanding commodities of importance to the food industries.

into cut-throat competition; and an era of unwarranted price cutting followed.

Wiser leaders of the industry knew that flour was an essential commodity. They knew that the orders lacking from the order books were but deferred, not lost. They saw no necessity for radical price cutting or offerings below cost of production. But they could not persuade their fellow members of the industry that the customary yardstick was warped by a new trade situation. The latter failed to gage their plans according to a surer index, one of current and prospective consumption. Had they done so they might have saved themselves much distress.

Fruit and vegetable canners have been experiencing, in the last few seasons, a somewhat similar difficulty of readjustment. Formerly, many members of the canning industry contracted for the marketing of their entire output with brokers or arranged through their distributing channels an assured market for at least their pack before the season opened. Such arrangements were then deemed essential by prudent managers. Now in many areas and for many of the major commodities, such advance marketing is no longer feasible. A changed index of programming is therefore essential. The industry is now diligently at work to establish a statistical base appropriate to the new situation.

Under the old scheme of canned goods marketing, comparatively small percentages of the pack were held in the warehouses of the canners. Indeed, many canners had no large warehouse facilities of their own but shipped their output almost at once following packing. Today these same packers find it necessary to warehouse much, if not all, of their pack, often large percentages for nearly a full season. They are, therefore, very wisely working toward an index by which the industry may gage the quantity of canned goods in stock in the hands of original producers. Such an index formerly would have been useless. Today it gives promise of being an excellent gage of market movement and of consumption. Presumably, many other industries need to make similar readjustment of their affairs.

Meat packers have a still more complicated problem, not only with respect to fresh meat but also with respect to the secondary meat products, lard, sausage, and the like. Fortunately, however, their affairs can be gaged in advance for periods somewhat longer than those which affect the commodities previously discussed. The number of cattle coming to market can, for example, be anticipated for the industry as a whole many months in advance. Such forecast may be based on the cattle population of the tributary areas. Forecasts having even longer time significance include those based on grain prices and on the intentions to breed as reported regularly by the Department of Agriculture. When there is an upward trend in intention or in actual cattle population it is obvious that the numbers which may be expected to come to market soon are on the increase. Preparation can therefore be made not only for the kill and processing operations but also to some extent for the cold-storage holding or the direct marketing of the products.

Such forecasts are necessarily modified by many considerations. The beef packer must concern himself not only with cattle prospects but also with hog population and kill, mutton and lamb trends, and even with the factors of cold-storage holdings and prospective price of meat substitutes. The inter-commodity competition, affected very largely by relative price, is often the dominating consideration in these economic areas. The extended ramification of some of these inter-commodity influences was discussed last month in the pages of FOOD INDUSTRIES in an article dealing with corn-hog-pork-lard relationship. The indexes there are typical of those required by all of the meat-producing divisions of the packing industry.

Each separate commodity of the food industries has its own indexes. If space permitted, it would be possible to go ahead and discuss the significance of cocoa bean imports with respect to cocoa and chocolate, cold-storage holdings with respect to eggs, visible world stocks as a gage of prospective sugar price, and the corresponding figure for each other class of commodity. It is not feasible to generalize regarding all of these, since into each market study enters some distinctive factor. Traders in these commodities recognize these influences. Manufacturers who either make or buy these commodities must become equally familiar with them.

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Standards Needed for Citric Acid Solution

A STUDY of beverages from all over the United States, made by the American Bottlers of Carbonated Beverages, under the direction of J. H. Toulouse, director of the service laboratory of that association, indicates a wide variance in the quantity and proportions of the ingredients. One of the chief variables is citric acid and one of the chief reasons for the variations of this ingredient is the general confusion over what is meant by "50 per cent citric acid solution."

The actual strength of the acid solution does not matter as long as the proper proportions of acid, flavor, and sugar obtain. The difficulty comes when an acid solution designated as "50 per cent" in one formula is applied to another formula which also calls for "50 per cent" acid solution but defines it as one of an entirely different composition. Perhaps the bottler may misjudge a promising new flavoring material and discard it simply because a solution described as "50 per cent" acid was used without determining just what acid was actually intended by the manufacturer of the flavor. This is quite possible, since a review of common formulas shows a variation of nearly 70 per cent.

From a study of formulas for making citric acid solutions, it appears that the extremes are actually 32.4 and 49.25 per cent. The first is obtained by adding 4 lb. of crystals to 1 gal. of water, securing not quite $1\frac{3}{8}$ gal. of solution. The second is made by placing 5 lb. of crystals in a gallon container, adding warm water to dissolve the crystals, and then filling the container to the top with water. This makes just 1 gal. of solution. The basic "4 lb. crystals plus 4 pints water" solution contains 48.97 per cent citric acid. Either of these last two can be satisfactorily used as a 50 per cent solution.

Confusion is sure to result from misuse of the two extremes, the 32.4 and the 49.25 per cent acid solutions. One fluid ounce of the weaker solution actually contains 0.384 avoirdupois ounce of citric acid. One fluid ounce of the heavier solution contains 0.625 avoirdupois ounce of acid. It has nearly twice the acidifying power of the weaker solution. A fruit-flavored beverage calling for $1\frac{1}{2}$ fluid ounces of the weaker solution per gallon of syrup would be almost more acid than a lemon sour soda if the stronger were substituted. A dry ginger ale or a lemon sour, the formula for which required only an ounce of the strong solution, usually added to a thin syrup of 27 deg. Baumé or less, would be hardly as acid as the sweet varieties of the same flavors if the weak solution were used. Perhaps examples of both types of flavors could be found on the shelves of the same syrup room, and it is not unlikely that the acid solution actually used with them may be different from that specified by either flavoring formula.

The term "50 per cent acid" comes, of course, from the use of 1 lb. of crystals to 1 pint of water. The solution so made is not actually 50 per cent in strength, because a pint of water weighs about two-thirds of an avoirdupois ounce greater than a pound. Nevertheless this solution is so close to 50 per cent that for all practical purposes it can be considered as such. Because of the ease of measuring both acid crystals and water in this method of making the solution, and because of the fact that any multiple of this ratio (pound to pint) is easily used, the solution is a very acceptable standard.

"Figuring Out" the Formulas For Beverage Flavoring Syrup

SUPPOSE a formula for a carbonated beverage calls for 1 oz. of flavor and 1¼ oz. of acid per gallon of 28 deg. Baumé sugar syrup. And suppose the sugar syrup you have on hand is 34 deg. Bé. What's to be done?

Of course, you can always dilute the syrup; that solves the problem without even picking up a pencil. But from the standpoint of sanitation, it would be better to avoid the handling, the contact with measuring vessels, and the added water. The less concentrated syrups, too, ferment more readily.

It is quite apparent that if more flavor and acid be added to the more concentrated syrup, and the quantity of syrup used in each bottle be cut correspondingly, the result will be the same as with the original formula. It is one of those simple looking little problems, but when you sit down to "figure it out," the clock seems to start spinning around, and soon your head seems to start spinning around, and finally you throw down your pencil in disgust and go out and dilute the stock syrup to the strength of that called for in the formula anyway.

Julian H. Toulouse, director of the service laboratory of the American Bottlers of Carbonated Beverages, recently compiled a formula conversion table (see Table I) that simplifies this problem. In the left-hand vertical column are listed syrup concentrations (in degrees Baumé) that may be given in formulas. Across the remaining columns are listed syrup concentrations (in degrees Baumé) of stock syrups that may be on hand. The body of the table shows the ratio of sugar content and, of course, the ratio of ingredients to be added thereto. In other words, for each ounce of flavor called for in a formula for 28-deg. Bé. syrup, 1.40 oz. will be necessary in a 34-deg. Bé. syrup. For the 1¼ oz. of acid required in a formula for 28-deg. Bé. syrup, 1.75 oz. (1¼x1.4) of acid will be necessary in a 34-deg. Bé. syrup.

Having found the quantities of acid, flavor, color, and other ingredients to be used per gallon of the stock syrup so as to maintain the proper proportions of the original formula, it then becomes necessary to decrease the quantity of syrup per bottle in order that the proper sugar content will be obtained. Tables to simplify this step have also been issued by the American Bottlers of Carbonated Beverages (see Tables II, III, IV, V).

Knowing the sugar content desired in the beverage, it is only necessary to locate in the tables the bottle size and the Baumé reading on the flavored syrup. In line with these two values will be found the quantity of syrup necessary per bottle, in ounces. For larger size bottles, proportionate quantities of syrup are required; with a 24-oz. bottle, for instance, throw four times the quantity necessary for the 6-oz. bottle. Note that the Baumé readings used in Tables II, III, IV, and V are for the *flavored* syrup, not those of the simple syrup before flavor and color are added.

The following sample formula is based on the data calculated for a beverage (dry ginger ale) by use of the tables:

Ingredient	Formula as Taken From Former Label	Formula Adapted to Your Own Stock Syrup
Syrup strength	28 deg. Bé.	34 deg. Bé.
Quantity syrup	1 gal.	1 gal.
Acid per gallon	1¼ oz.	1¾ oz.
Flavor per gallon	1 oz.	1.4 oz.
Color per gallon	½ oz.	¾ oz.
Throw to get 8 per cent sugar:		
7 oz. bottle	15/16 oz.	⅞ oz.
12 oz. bottle	1⅞ oz.	1¼ oz.

Table I—For Converting Ounces of an Ingredient Per Gallon of Syrup of a Specified Baumé Strength to Ounces Per Gallon of Syrup on Hand

Concentration (in Deg. Baumé) of Syrup in Formula	Concentration (in Deg. Baumé) of Stock Syrup								
	28	29	30	31	32	33	34	35	36
20	1.63	1.71	1.78	1.85	1.93	2.02	2.10	2.17	2.25
21	1.53	1.61	1.69	1.75	1.83	1.90	1.98	2.07	2.15
22	1.45	1.52	1.59	1.68	1.73	1.81	1.88	1.96	2.03
23	1.38	1.44	1.51	1.57	1.65	1.71	1.79	1.86	1.93
24	1.31	1.37	1.43	1.50	1.56	1.63	1.69	1.77	1.83
25	1.25	1.30	1.36	1.42	1.48	1.54	1.61	1.68	1.75
26	1.18	1.24	1.30	1.36	1.42	1.47	1.53	1.59	1.66
27	1.12	1.18	1.24	1.29	1.35	1.41	1.46	1.53	1.58
28	1.00	1.12	1.18	1.24	1.29	1.34	1.40	1.46	1.52
29	0.89	1.00	1.12	1.18	1.24	1.28	1.34	1.39	1.45
30	0.85	0.89	1.00	1.12	1.18	1.23	1.28	1.34	1.38
31	0.81	0.85	0.89	1.00	1.12	1.18	1.23	1.28	1.33
32	0.77	0.81	0.85	0.89	1.00	1.12	1.18	1.23	1.28
33	0.75	0.78	0.81	0.85	0.89	1.00	1.12	1.18	1.23
34	0.72	0.75	0.78	0.81	0.85	0.89	1.00	1.12	1.18
35	0.69	0.72	0.75	0.78	0.81	0.85	0.89	1.00	1.12
36	0.66	0.69	0.72	0.75	0.78	0.81	0.85	0.89	1.00

Table II—Ounces Syrup Thrown to Obtain 8 to 8½ Per Cent Sugar

Baumé of Flavored Syrup	Size of Bottle in Ounces					
	6	6½	7	7½	8	9
26	¼	⅜	⅛	1/16	⅛	⅛
27	⅜	¼	⅛	1/16	⅛	⅛
28	⅜	¼	⅜	⅛	1/16	1/16
29	¼	⅜	¼	⅜	⅛	1/16
30	¼	⅜	¼	⅜	⅛	⅛
31	⅜	¼	⅜	¼	⅜	1/16
32	⅜	¼	⅜	¼	⅛	⅛
33	¼	⅜	¼	⅜	⅛	⅛
34	¼	⅜	¼	⅜	⅛	⅛
35	1/16	¼	⅜	¼	⅜	⅛
36	1/16	¼	⅜	⅜	¼	¼

Table III—Ounces Syrup Thrown to Obtain 10 to 10½ Per Cent Sugar

Baumé of Flavored Syrup	Size of Bottle in Ounces					
	6	6½	7	7½	8	9
26	¼	1/16	¼	⅛	1/16	⅛
27	1/16	¼	1/16	⅛	⅛	⅛
28		1/16	1/16	¼	1/16	1/16
29	⅛	1/16	¼	1/16	¼	⅛
30	⅛		1/16	¼	1/16	⅛
31	¼	⅛		1/16	1/16	1/16
32	¼	⅛	¼		1/16	⅛
33	⅛	¼	⅛	¼	⅛	⅛
34	⅛	¼	⅛	¼	1/16	1/16
35	¼	⅛	¼	⅛	¼	1/16
36	⅛	¼	⅛	¼	⅛	⅛

Table IV—Ounces Syrup Thrown to Obtain 11¾ to 12¼ Per Cent Sugar

Baumé of Flavored Syrup	Size of Bottle in Ounces					
	6	6½	7	7½	8	9
26	¼	⅜	¼	⅜	¼	2
27	¼	1/16	⅜	¼	⅜	⅛
28	1/16	¼	⅜	1/16	1/16	⅛
29	⅜	1/16	¼	1/16	⅜	⅛
30	1/16	1/16	¼	⅜	1/16	⅜
31	1/16	⅜	1/16	1/16	⅜	⅜
32		1/16	1/16	¼	1/16	1/16
33	⅛	1/16	⅜	1/16	¼	⅜
34	⅛		1/16	⅜	1/16	1/16
35	⅜	⅛	1/16	⅜	⅜	1/16
36	⅛	1/16		1/16	⅜	⅜

Table V—Ounces Syrup Thrown to Obtain 13½ to 14 Per Cent Sugar

Baumé of Flavored Syrup	Size of Bottle in Ounces					
	6	6½	7	7½	8	9
26	1/16	1/16	⅜	⅜	2	2⅛
27	⅜	⅜	⅜	⅛	⅛	2⅛
28	1/16	1/16	1/16	⅜	⅛	2
29	⅛	⅜	⅛	⅜	⅜	⅛
30	1/16	1/16	1/16	1/16	⅜	⅜
31	1/16	⅜	⅜	⅜	1/16	⅛
32	⅛	⅛	⅜	1/16	⅜	⅜
33	⅛	⅛	1/16	⅜	⅛	1/16
34	1/16	1/16	⅛	1/16	⅛	1/16
35	⅛	⅜	1/16	⅛	1/16	1/16
36	⅜	1/16	⅜	1/16	1/16	1/16

A semi-trailer milk tank truck of 2,500-gal. capacity, with inner shell of Alleghany metal

Corrosion of Food Equipment Can Be Controlled

By L. W. HOSTETTLER
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MATERIALS of construction for equipment used in the manufacture of foods are subjected to conditions calling for a very high resistance to corrosion of various types. The two most important conditions arise from the product itself and the cleansing and sterilizing agents. These corrosive conditions apply to the "product" side of the apparatus. Among those affecting the apparatus elsewhere are heating and cooling mediums such as water, steam and brines when used with jacketed equipment, and stray electric currents from both individual and plant motors.

While this article deals primarily with the 18-8 group of chrome-nickel alloy steels, recommendations made as to care for equipment in service to prevent failure are applicable to other materials.

Consider the alloy itself. From the standpoint of corrosion it has been found remarkably resistant to organic acids, making it an ideal material for the preparation and handling of food products. With inorganic acids it is markedly resistant to nitric, while soluble in varying degree in sulphuric, hydrochloric, and hydrofluoric.

Careful consideration of the corrosive media to which food processing equipment is subjected and of the relative corrosion resistance of the various materials going into equipment, shows clearly the necessity for care in the control and use of chemical sterilizers, most of which liberate free chlorine; brines, which if acid form hydrochloric acid and if too alkaline are also highly corrosive; and many waters used for heating and cooling which are from wells and contain chlorides, such as calcium and magnesium, and form sulphuric or hydrochloric acid. Most waters also contain large quantities of dissolved gases, which, when released, become highly corrosive.

There is no material commercially available which is a "cure-all," as none of them, not even the 18-8 alloy, are resistant to all the corrosive media to which they are subjected. Hence the user is confronted with the problem of keeping the rate of corrosion at a minimum by careful control of plant operating conditions.

An example of improper use of chemical sterilizers is found where sodium hypochlorite is applied and allowed to remain on the surface of the equipment for a sufficient period to go to complete evaporation. Immediately after being sprayed it naturally collects in drops or globules. Under each drop a very small pinhole usually is formed, many times not apparent to visual inspection. With a 20 to 40 diameter magnifying glass it is clearly discernible, however. No particular advantage is gained, so far as sterilization goes, by long contact with these chemical sterilizers, as a few minutes will make the equipment just as sterile, with no harmful effect to the apparatus itself. With the concentration generally used, which gives about 100 parts of available chlorine per million parts of water, the 18-8 alloy is not attacked if not held for longer than four hours. This applies particularly to milk-truck tanks and tank cars.

Brines should be checked each week, and never allowed to become acid, as hypochloric acid attacks all materials going into the make-up of food processing equipment. Neither should they be used too alkaline, as they are then also highly corrosive. Keep brines neutral or slightly alkaline to keep corrosion of equipment at a minimum. Calcium brines usually are more corrosive than sodium brines. Information and service in brine and water control are available from many sources.

Circulating systems go acid much quicker than many operators realize; many times with ruinous results to equipment. One large dairy, with a weekly brine check from each of five plants, finds that it requires an average of 60 days for brine to go acid in the circulating system, whereas the closed system requires about six months.

Keep brines as free as possible from contamination by air, as absorption of the products of the atmosphere not only tends to turn brine acid quickly but, where by change these dissolved gases are liberated in the fork of a bubble and find lodgment on the surface of the equipment, violent corrosive action will occur.

De-aerating the make-up water to assure a safe oxygen value and checking the layout of the brine circulating system to keep it as free as possible from oxygen contamination assures a minimum of equipment corrosion.

Waters used for heating and cooling many times contain large quantities of dissolved gases, which, as in the case of brines, when liberated and finding lodgment on equipment surfaces, set up

electrolytic action and start active corrosion.

While excessive quantities of dissolved gases in brines and cooling waters are bad, there is another condition equally bad and that is the presence of chlorides in excess of safe values. A typical example of bad water corrosion is shown by the accompanying analysis of water used by a dairy plant on the eastern seaboard. This water comes from a well 148 ft. deep, surrounded by the entire Atlantic Ocean and was used for heating and cooling.

This plant could not and did not use this water in its boilers, as it was found to corrode and ruin the tubes at a rate that was prohibitive, but it did not discontinue to use it for heating and cooling in jacketed equipment until corrosion had progressed to a point where the equipment had to be replaced. The cost of replacement was an unnecessary and unwarranted expense which would never have occurred if this particular water had been recognized as being as corrosive to the jacketed equipment as to the boilers and been treated and de-aerated.

Analysis of Water

Total Solids		518.66	Grains U. S. Gal.	Calculated as	
SiO_2	Silicon dioxide	1.05	Grains U. S. Gal.	SiO (Silicon dioxide)	1.05
Na_2O	Sodium oxide	114.27	Grains U. S. Gal.	Fe_2O_3 (Iron oxide)	.84
MgO	Magnesium oxide	41.03	Grains U. S. Gal.	Al_2O_3 (Aluminum oxide)	.....
CaO	Calcium oxide	17.75	Grains U. S. Gal.	Organic	45.94
FeO	Iron oxide	.....	Grains U. S. Gal.	NaCl (Sodium chloride)	215.97
Al	Aluminum oxide	.84	Grains U. S. Gal.	$MgCl_2$ (Magnesium chloride)	196.52
SO_3	Sulphur trioxide	20.63	Grains U. S. Gal.	$Mg SO_4$ (Magnesium sulphate)	24.75
Cl	Chlorine	248.38	Grains U. S. Gal.	$CaSO_4$ (Calcium sulphate)	7.02
....	Organic	45.94	Grains U. S. Gal.	$CaCO_3$ (Calcium carbonate)	26.45
CO_2	Carbon dioxide	28.68	Grains U. S. Gal.		

Total Suspended Matter, 3.98 Grains per U. S. Gal.

Fe_2O_3 (Iron oxide)	2.61	Grains per U. S. Gal.
SiO_2 (Silicon dioxide)	.25	Grains per U. S. Gal.
Organic	1.12	Grains per U. S. Gal.

Note the large amounts of sodium chloride and magnesium chloride. The magnesium chloride hydrolizes and forms hydrochloric acid. This water was very high in dissolved gases which added to its corrosive properties.

Leakage of current from motors in food manufacturing plants is another source of corrosion. The highly humid atmospheric condition prevailing in many plants of this kind is ideal for stray current. At small expense this can be entirely eliminated by individually grounding the motors, rather than allowing them to ground through the equipment itself. In addition to this, a careful check-up of the building itself is well worth while, as evidenced by the experience of several plants where it was found that sewer outlets were actually conducting stray current from surface and elevated electric lines directly into their buildings.

The following "common-sense" precautions on the part of plant operators would go far in eliminating the most common types of corrosion now going on month after month:

1. Individually ground all the motors to avoid electrolysis.

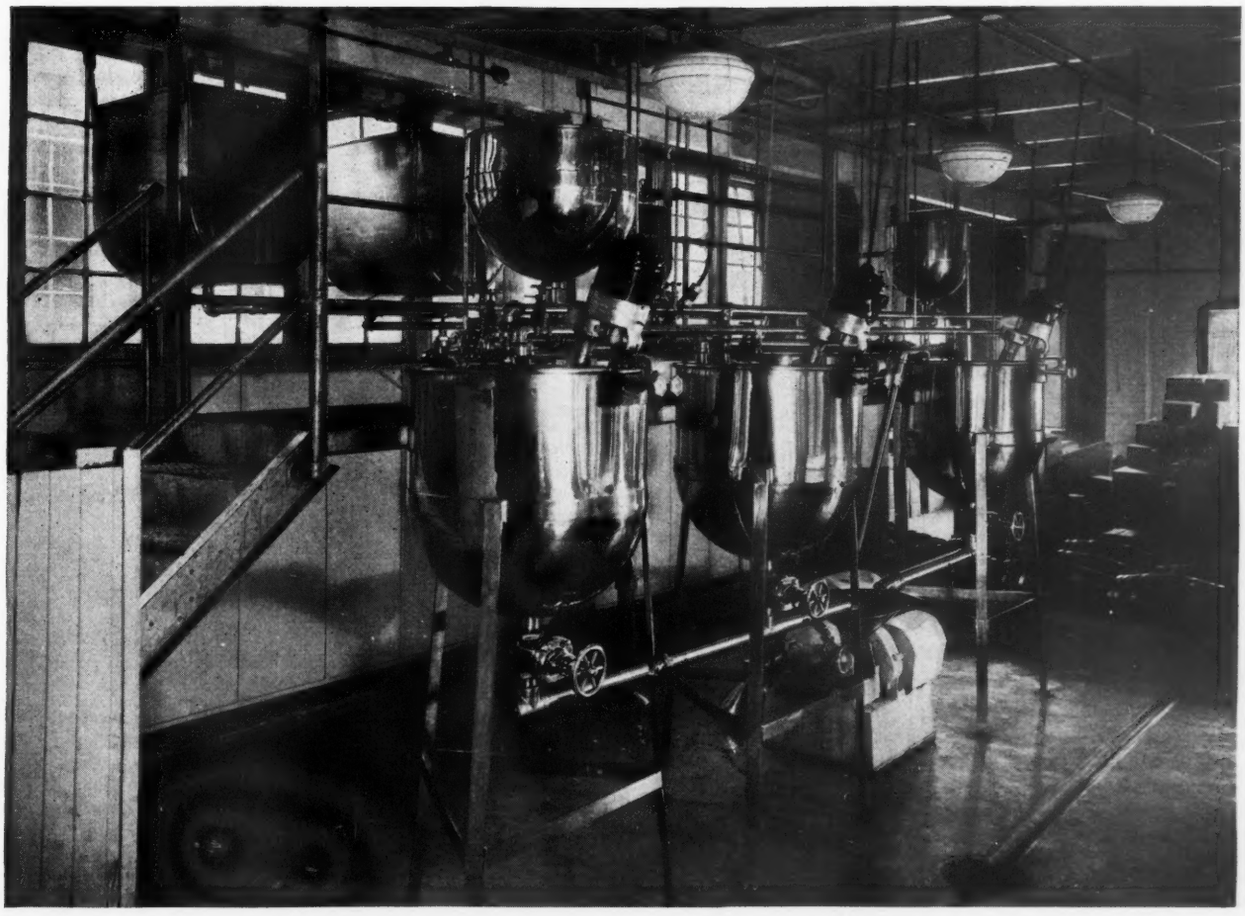
2. Analyze the water used for heating and cooling. Bad waters are many times highly corrosive, particularly if they contain any quantity of dissolved oxygen. De-aeration and treating of bad waters will protect equipment from corrosion and possible failure.

3. Brines, both calcium and sodium, should be checked weekly. Hydrochloric acid is formed when brines run acid. Keep brines neutral or only slightly alkaline, as too much alkalinity makes brines more corrosive. Circulating systems go acid much quicker, due to contamination by absorption of air. Keep brines de-aerated.

4. When brines are used, jacketed equipment should be washed out with clear, sweet water immediately after brines are drained. Refilling with clear, sweet water will further protect the metal surfaces.

5. Use chemical sterilizers only just prior to operation. Do not allow them to remain on the metal surfaces long enough to evaporate.

All-welded jacketed mayonnaise kettles made of Alleghany metal



ABSTRACTS OF CURRENT LITERATURE

SCIENCE AIDS THE CANNERS. E. F. Kohman. *Hygeia,* Vol. 10, pp. 149-151; February, 1932.

Considerable loss of energy value may occur under ordinary conditions of handling vegetables as the result of oxidation. Storage of raw vegetables for 26 hours at 86 deg. F. showed losses of energy value ranging from 13.6 per cent in asparagus down to 2 per cent in beets. Development of off-flavors in raw vegetables and fruits may occur as a result of bruising or cutting. Enzymic changes may also affect the vitamin content. These biological changes make it imperative for canners to utilize rapid continuous processes in their plants. Nevertheless, sauerkraut will normally have a high vitamin C content despite the bruising that is occasioned by shredding and packing, because of the anaerobic conditions which prevail in sauerkraut curing. Salad vegetables are normally expected to have high vitamin C content, but a test shows that 4 gr. of canned turnip greens were superior as an anti-scorbutic to 10 gr. of celery or 15 gr. of head lettuce. No explanation is offered for this wide divergence.

* * *

CHEMICAL SWELLING OF CANS. G. Lunde and K. Wulfert. *Tids. Hermetikind,* Vol. 17, pp. 223-7 (1931). [From *Chemical Abstracts,* Vol. 26, p. 775; Feb. 10, 1932.]

Cans containing pickled herring or mackerel, or herring in tomato sauce, are especially likely to swell. Swelling increases with rise in temperature. Hydrogen formations in cans containing bristling or herring in oil does not occur until after considerable corrosion of the interior of the cans has taken place. No hydrogen was found in cans containing various kinds of salted and spiced herring, although the interior of the cans was corroded. This suggests the possibility of the presence of a hydrogen acceptor in the fish.

* * *

COMPARATIVE STUDY OF JUICES FROM FROZEN FRUITS. T. A. Pickett. *Industrial and Engineering Chemistry,* Vol. 24, pp. 353-4; March, 1932.

The juices from frozen blackberries, cherries, dewberries, peaches, pears, plums, raspberries, and strawberries have a greater titratable acidity than juices from the fresh fruits. These differences appear to be due to a breaking down or increased permeability of the cells upon freezing, so that a more complete extraction takes place. The juices from these fruits increase in titratable acidity as the length of storage at 10 deg. F. increases. This increase is due to some extent to dehydration of the fruit, but data show this factor is not sufficient to account for the entire increase in titratable acidity. The juices of the fruits frozen at —100 deg. F. are more nearly like the fresh juices in titratable acidity than those frozen at 10 deg. F. The increases in acidity of the juices of the fruits upon freezing and storage are due to a concentration of the same type of acids present in the fresh juices.

* * *

SUGAR JUICE CARBONATION STUDIES. L. Dostal. *Z. Zukerind Czechoslov.,* Vol. 56, pp. 1-9 (1931). [From *British Chemical Abstracts, B,* Vol. 51, p. 40; Jan. 8, 1932.]

A method and apparatus for laboratory or semi-factory scale study of beet juice are described, in which much more concordant results can be obtained than hitherto in such studies. Average differences in parallel trials with the same raw juice were 0.06 per cent in purity of final juice, 0.6 deg. Stammer in its color, 6.7 per cent in the duration of filtration, and 38.5 per cent in duration of sweetening-off, the sugar content of the scums being reduced to 0.29 per cent with a water consumption of 146 per cent.

* * *

EFFECT OF HEAT AND ALKALINITY ON VITAMIN G. Nellie Halliday. *Journal of Biological Chemistry,* Vol. 95, pp. 371-385; February, 1932.

Heating (at 97 deg. C.) for 1 hour at pH of 4.3 resulted in a 10 per cent loss of vitamin G; 1 hour at pH of 7 resulted in a 30 per cent loss; and 1 hour at a pH of 10 to 8 resulted in a 40 per cent loss. Heating for longer periods of time at the same pH concentrations resulted in progressively greater losses of vitamin G potency. Holding for 1 week in the cold at pH of 4.3 and pH of 7 caused practically no loss, but at pH of 10 fully 75 per cent of the vitamin was destroyed.

* * *

HYDROGEN-ION CONCENTRATION AND PANARY FERMENTATION. P. H. Alton and E. A. Fisher, St. Albans, England. *Cereal Chemistry,* Vol. 9, pp. 34-44; January, 1932.

The hydrogen-ion concentration of dough changes comparatively little during fermentation. The greater part of the change in pH occurs in the first hour, when gas production is comparatively slow. There is no relation, however, between rate of gas production and rate of change of pH. Addition of highly diastatic malt extract and ammonium phosphate or of cane sugar has marked effect in prolonging the period of high gas production, but has relatively little effect on the pH of the dough. "Knocking-back" (by rolling out the samples) has no appreciable effect on dough pH, but has marked effect in prolonging the period of high gas production. Additional "knocks-back" should be given to doughs which are delayed in their passage to the oven in order to prolong their period of good "working." The change in pH plays a very minor part in panary fermentation and in dough ripening.

CORROSION OF METALS BY MILK. Colin G. Fink and Frederick A. Rohrman. *Journal of Dairy Science,* Vol. 15, pp. 73-85; January, 1932.

Modern electrolytic theories of corrosion indicate that effect of milk on metals cannot be due solely to acid corrosion or oxygen. Electrochemical replacement of copper naturally present in milk by other metals, particularly nickel, appears to be a primary cause. Particularly in the regenerators, copper content of milk decreases and nickel content increases, leading to serious corrosion problems. Before milk is heated to pasteurizing temperatures, when it contains a considerable quantity of dissolved oxygen, such corrosion is much less, due to presence of a protective oxide film. No alloy of copper and nickel non-corrosive at both low and high temperatures was found. High chromium-nickel (18-8) iron alloys, chromium-plated nickel and chromium-plated copper were found very resistant. "Hyblum," a nickel-aluminum alloy (Al 95, Ni 5), resisted milk corrosion, but does not stand up well for cleaning solutions now commonly used.

* * *

METHOD FOR THE pH DETERMINATION OF BUTTER. O. F. Hunziker, W. A. Cordes and B. H. Nissen. *Journal of Dairy Science.* Vol. 14, pp. 347, 372; July, 1931.

Because of the non-conductive property of butter fat, the curd-serum portion must be separated from the fat before an electrometric determination of pH can be made. This does not affect validity of the measurement, however, as fatty acids affecting pH are water soluble and enter the serum portion on melting. The quinhydrone electrode was found to give essentially the same results on butter as the standard hydrogen electrode with a more simple and practical procedure. Dilution of butter or curd-serum caused marked pH changes, leading to erroneous results. Removal of the curd from the curd-serum mixture tended to lower pH value slightly.

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VITAMIN D AND IRRADIATION. F. F. Tisdall. *Canadian Chemistry and Metallurgy,* Vol. 16, pp. 9-11; January, 1932.

The first of a series of articles on the vitamins in which a résumé of the work underlying the authentic advance is described briefly. Of especial importance are the significance of bread as a vehicle and the ease of potency control with the use of the concentrated material.

* * *

CLARIFICATION OF BEET JUICE BY REDUCED LIME TREATMENTS. J. Vasatko. *Z. Zukerind Czechoslov,* Vol. 56, pp. 117-20 (1931). [From *British Chemical Abstracts, B,* Vol. 51, p. 40; Jan. 8, 1932.]

Optimum conditions for clarification of beet juice are obtained by use of less than customary quantities of lime. Excessive liming may involve dissolution of a portion of the precipitated matter. Efficiency of clarification varies with the temperature of the solution and the time of treatment. A method for determining the optimum lime dosage is described.

BOOK REVIEWS

SÜSSMOST. FACHBUCH DER GERVERBSMÄSSIGEN SÜSSMOSTERZEUGUNG. By Alfred Mehlitz. Published by Dr. Serger und Hempel, Braunschweig, 1931. 208 pp.; 56 illustrations. Price, bound, 8.40 marks; paper, 6.60 marks.

THERE is a world-wide trend to produce and consume more unfermented fruit beverages. In spite of the rapid development of this industry in the United States and in Europe as well, there is a lack of handbooks on this subject. Dr. Mehlitz's book on fruit juices is a pioneer in the literature of this important branch of the agricultural industry. It gives detailed instructions for the preparation and handling of juices of different fruits such as apples, pears, grapes, cherries, and strawberries.

In the first section advice is given for the selection of different fruit varieties and blends. The different methods for pressing, clarification, filtration, preservation, storage, and bottling are discussed. Considerable space is devoted to the important problems of clarification and preservation of fruit juices. The short second section, on legal regulations, has no importance for the American producer. The third section, dealing with methods for the determination of the constituents, impurities, and other characteristics of the fruit juices, is very useful. In the short fourth section the defects of fruit juices are discussed.

Fifty-six illustrations of plant equipment and apparatus are included and described and discussed in detail. The whole book, however, represents mostly the methods used in Germany and other parts of Europe; American methods are only meagerly discussed. Very little is said about the American grape juice and cider industries, which are the greatest producers of unfermented fruit juices. As the first handbook on the industrial production of fruit juices, covering all problems and details of the production, however, it will be of much value and use to everybody interested in the subject.

Z. I. KERTESZ.

* * *

CYCLES IN WHEAT PRICES. By Holbrook Working and others. Wheat Studies of the Food Research Institute, Vol. VIII, No. 1. Published by Stanford University, California, November, 1931. 66 pp., 8½x11; 17 charts, 2 plates, 7 tables; paper. Price, $1.50.

BECAUSE monthly data are insufficient to give important factors of price movements of wheat in the United States, weekly averages of daily prices for the years 1884-1917 and 1921-1931 are used. During these 43 years five important types of movements were found: The seasonal cycle in cash prices, crop-scare and related cycles, long cycle of wheat prices, movements related to cyclical changes in general wholesale prices, and movements directly traceable to the size of the world wheat crop harvested during the season.

All but the last tend to recur in cycles and all but the first are reflected in the price of wheat futures. Movements associated with a long cycle in wheat prices, with general wholesale prices, and with the size of the world wheat crop appear of about equal importance. An increase in price due to crop-scare and related cycles is almost always followed by an almost equal price decline.

* * *

THE COURSE AND PHASES OF THE WORLD ECONOMIC DEPRESSION. By Professor Ohlin, Stockholm University. Published by the Secretariat of the League of Nations, Geneva, 1931. 338 pp., 6¼x9⅜; paper. Price, $3.

THE revised and final American edition of this report to the Assembly of the League of Nations is cloth bound and fully indexed. It is obtainable only through the World Peace Foundation, 40 Mt. Vernon St., Boston, Mass.

Included in this report are: Review of Post-war Economic Development up to the Present Depression; Structural Changes and Incomplete Adjustment in the Years Preceding the Depression; Business-cycle Tendencies in the Last Decade; The Phases of the Present Business Cycle; Description and Analysis of the Depression; Comparison With Earlier Depressions; and The Situation in the Summer of 1931.

Particularly interesting is the rôle played by the production and consumption of food and foodstuffs. The per capita consumption of food varies little. The variety and quality of food demanded change perceptibly with changing economic conditions.

* * *

PATENT LAW FOR CHEMISTS, ENGINEERS, AND EXECUTIVES. By Fred H. Rhodes, Professor of Industrial Chemistry, Cornell University. Published by McGraw-Hill Book Co., Inc., 330 West 42d St., New York, N. Y., 1931. 207 pp., 5¾x8¼; cloth. Price, $2.50.

NON-LEGAL laymen have vague and conflicting ideas regarding what a patent is; how it may be obtained; what power it gives its owner; what significance it has in court action; and whether it is a desirable means of getting a monopoly on one's invention.

Unless he has had previous experience in relation to patents and the laws pertaining to them, the reader of this book will find it quite enlightening. The subject matter is presented under fourteen headings that bring out the fundamental principles of patent law. Nature of patents, their scope, and the amount of protection given by them are emphasized. For the layman who has had some experience with patents, Prof. Rhodes includes enough references from court decisions and case citations to familiarize him with some of the whys and wherefores of his experiences.

The book is written in language of the layman and each point is clearly and concisely presented. The definition of a patentable device can be cited as an example: "It must be a true invention; it must be new; it must be useful; and it must be an art, a machine, a manufacture, or a composition of matter." Characteristic forms are given in an appendix. An index of citations as well as a subject index is included in the book.

* * *

BANANA BREEDING AT THE IMPERIAL COLLEGE OF TROPICAL AGRICULTURE. By E. E. Cheesman. Published by His Majesty's Stationery Office, Adastral House, Kingsway, London, W. C. 2, December, 1931. Obtainable from British Library of Information, 270 Madison Ave., New York, N. Y. 40 pp., 7⅜x9¼; 8 figures; paper. Price, 30 cents plus postage.

RECENT developments in the manufacture and use of banana flour lend interest to this progress report of the Empire Marketing Board (No. 47). Three previous reports have been made on the scientific work carried out in Trinidad on bananas since 1922.

The object is to develop a banana with the compactness of bunch, bruise-resisting skin, adaptability to bulk transport, and attractive ripening appearance of the Gros Michel variety and with the resistance or immunity to Panama disease that less desirable varieties possess.

* * *

THE EMPLOYMENT OF WOMEN IN SLAUGHTERING AND MEAT PACKING. By Mary Elizabeth Pidgeon. Published by U. S. Government Printing Office, Washington, D. C., 1932. 210 pp., 6x9¼; 2 illustrations; charts and tables in text and appendices; paper. Price, 40 cents. Superintendent of Documents.

ALTHOUGH this report is the 88th bulletin of the Women's Bureau of the U. S. Department of Labor, this is the first inclusive report made on female employment in a food-producing industry. Bulletin 82 reported employment of women in Hawaiian pineapple canneries and a few other bulletins were limited to studies in specific states or cities.

All food industrialists employing women, especially in the highly seasonal or fluctuating industries, will find excellent economic data in this report for comparisons with conditions in their own individual businesses. Personnel departments of large companies will find this bulletin particularly helpful and enlightening.

* * *

MERCK'S INDEX. Fourth Edition. Published by Merck & Co., Inc., Rahway, N. J. 585 pp., 6½x9⅜; fabricoid. Price, $5.

NOT since 1907 has the American version of this handy and useful encyclopedia of chemicals, botanicals, and drugs been available to the food chemist in up-to-date form. It gives names and synonyms; sources; chemical formulas and molecular weights; physical, chemical, and medicinal characteristics, therapeutic uses and dose limits; antidotes; special precautions; and other subjects of interest and importance to the chemist regarding the materials he uses.

All substances described are listed and cross-listed in alphabetical order. Included is a 26-page appendix containing tables of chemical and physical data and conversion tables.

THIS MONTH

APRIL

March 28-April 2—American Chemical Society, Hotel Roosevelt, New Orleans, La.

11-12—Bakery Sales Promotion Association, Wardman Park Hotel, Washington, D. C.

13—U. S. Food Standards Committee (hearing on definitions for tomato products), 10 a.m., Room 411, Bieber Bldg., Washington, D. C.

14—Food and Drug Administration (hearing on changes in Mapes Law regulations), 10 a.m., Dept. of Agriculture Bldg., Washington, D. C.

19-21—Fourth Annual Dairy Manufactures Conference for Dairy Technologists, University of Illinois, Department of Dairy Husbandry.

Hors d'Oeuvres

BRINGING HOME a market for the bacon is the task of a special representative of Poland's bacon industry, sent to the United States to develop market possibilities. Chiefly sought are sales to Polish residents.

•

WORMY FIGS are still plentiful, but they never get to the old general stores where they gained their reputation. U. S. inspectors detained over two million pounds of figs out of nine million imported last year. Worminess and mold were principal faults.

•

CASEIN from soya beans will be made in a plant under construction in the U.S.S.R. As milk is scarce, soya bean casein will cost but one-eighth of milk casein. The Soya Bean Institute, which has five experiment stations, developed the process.

•

MILK BOOTLEGGING will be a more serious offense than the ordinary kind in Rhode Island, if proposals in the State Legislature go through. Penalty for handling non-inspected milk, $1,000 first-offense maximum; for handling liquor, $100 first-offense maximum, Rhode Island laws may read.

•

"MADE IN HAWAII" may look well on ukuleles, but it need not appear on containers of sugar or other crude or semicrude imports, according to an official interpretation of a new customs regulation on country of origin designations. Similar exceptions apply to Porto Rico and the Philippines.

•

JELLY packed in imitation beer steins just isn't the custom. So the U. S. Customs Court ruled in levying a 50 per cent duty on the steins, as pressed glassware, in addition to the 35 per cent duty on the jelly therein. Importers thought the lower rate applied on the entirety.

•

PREPARED PIE CRUST, ready to roll, has been introduced in White Plains, N. Y., probably inspired by the success of ready-to-bake biscuits that have already caused housewives to leave the mixing bowl on the shelf.

What Food Men Are D

Sales Tax Dies—Sugar Plan Still Bre

A Drought for Dairymen?—"Good Foo

Decree—Bakery Eng

THE SALES TAX, dying ingloriously on March 25 by a 223 to 153 vote, had already been bled of most of its danger to food manufacturers. First fresh foods, then canned foods, finally all foods were exempted. Trade association secretaries sighed with relief.

Danger of new excise taxes that may hit specific food groups, affect all the industry, is not yet over. Carbonated beverages may still face a fight as Congressmen search for "luxury" items with a fine-tooth comb. War-time taxes on candy have been mentioned as a possibility. Excise taxes on automobiles (3 per cent on trucks is proposed), gasoline, would be worse than a sales tax to distributing organizations. Some large food companies will be hit by the provision already approved by the House eliminating credit for foreign taxes paid by corporations.

The fight for exemption of canned foods from the sales tax was the opening wedge that finally brought the whole thing tumbling down. Of that food manufacturers can be proud, or dismayed, as they analyze the situation.

PRACTICALLY PULLED from the grave, the Chadbourne plan, most elaborate stabilization scheme in economic history, was still alive on March 29. Just a few days before, verbal wreaths of "I-told-you-sos" were being directed by opponents of the plan to the Long Island home where Thomas L. Chadbourne was nursing neuritis; raw sugar prices, followed by refined sugar prices, had gone to record lows.

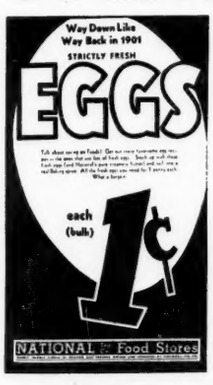
Because of consumption decreases, only by revising downward quotas set last year can the plan succeed. This is the task of the International Sugar Council, now meeting in Paris. Mr. Chadbourne's efforts had been repudiated by the Cuban sugar producers when he urged that Cuba's 1932 crop be cut to 2,350,000 tons to reconcile Java to revision. He did not go to Paris when the meeting resumed. "No hope of an accord" was thought possible when Cuba set 3,061,000 tons as a minimum.

At the last moment, Cuba cabled harried delegates that she would limit her crop to 2,700,000 tons if Java cut to 1,500,000 tons. As this is but 200,000 tons above the Council's last offer made to Cuba, negotiations are again not hopeless.

STATE REGULATION of the ice business in Oklahoma was condemned March 22 by the U. S. Supreme Court. A state law limiting the business to those able to prove to the Corporation Commission the necessity for supplying ice in any locality was declared unconstitutional. The majority opinion, read by Justice Sutherland, held that "a regulation which has the effect of denying or unreasonably curtailing the common right to engage in a lawful private business cannot be upheld consistent with the Fourteenth Amendment."

In a dissenting opinion, Justices Brandeis and Stone contended that, as the action of the state was not arbitrary or capricious, it did not conflict with the due process clause. Pointing to the evils that excess productive capacity and technological unemployment have entailed, the dissenting Justices argued that the states should have the right to try novel, social, and economic experiments without risk to the rest of the country.

OLD FASHIONED angel cake, with its "whites of eleven eggs," can take its place on economy budgets. Although total production of eggs by farm flocks on March 1 is 5 per cent less than a year ago, prices are down to levels of 30 years ago. From Jan. 15 to Feb. 15, prices dropped 19 per cent, and the decrease has continued at a more rapid rate than the usual seasonal trend.



In Chicago, "strictly fresh" eggs are advertised at 12c. a dozen retail. Repetitions of last year's "egg fights," in which citizens of producing regions smashed them in messy sport because prices fell below transportation cost, may occur when the producing season reaches its height. There has been little drop—but 2½ per cent—in the number of hens on farms since last year, despite low prices.

DAIRYMEN should pray for another drought. So H. A. Ross, of Borden's Farm Products Co., told farmers at Cornell's farm and home week. "If we do not have another drought this summer," he said, "the manufacture of dairy products will increase, and lower the farmers' return. The farmer has not heeded the trend in the supply of cows and today is facing the situation having 11.8 per cent more cows than in 1929."

Dr. Ross predicts, moreover, no material reduction in number of cows, and perhaps even a slight increase. He sees no promise of increased consumption in lowered prices, because of a corresponding drop in buying power. Already butter is going into storage rather than being drawn from storage, he pointed out.

In the wake of such dire statements, a

Doing and Saying

Breathes Weakly—One-Cent Eggs—Food—Not High Grade"—Packers' Engineers Are Frank

conference at Syracuse, N. Y., of more than 500 dairymen in the New York milk shed set up preliminary plans for a single cooperative, embracing both Dairymen's League and Sheffield Farms producers, to function on a non-profit basis. The industry is now operating at a loss of $20,000,000 a month, it was said. Fewer milk plants and better transportation would go a long way to cut losses, Prof. George F. Warren of Cornell declared. "I think we should plan rather soon," he said, "to have substantially all milk hauled from the country plant to the city in tank cars and tank trucks."

In New Jersey, two measures tightening milk regulations have passed the House. One would require that time and place of production be shown on containers of milk shipped into the state; the other would require pasteurization of milk within 48 hours of production; cream within 96 hours.

"GOOD FOOD—Not High Grade" will replace "Low Quality but Not Illegal" as the auxiliary designation for canned foods falling below McNary-Mapes Amendment regulations, if favorable opinions of the change are in the majority at a hearing scheduled for April 14. The Food and Drug Administration has called a hearing in Washington to discuss a number of changes that a year's practical operation of the canned food standards have brought to light. Another suggested change calls for appearance of the substandard designation in connection with each picture of the product on the label, as well as in connection with the name.

Specific standards established for peaches, pears, peas, tomatoes, apricots and cherries may also be considerably revised. The paragraph defining normal color will have the phrase "naturally developed" added thereto. Requirements as to tenderness and blemishes in several of the standards will have to be met by 90 per cent, rather than 80 per cent, of the contents. Other changes will simplify regulations as to amount of skin present on peeled fruits and variations in uniformity of size.

REITERATION of arguments that have been filling the notebooks of legal stenographers for over ten years echoed through the chamber of the U. S. Supreme Court on March 17 and 18, bringing to an incontestable decision the fate of Packers' Consent Decree modification. Briefs, though they belie that designation, were filed with the court by the government, the packers, and the National and American Wholesale Grocers' associations. No indication was given as to when the decision will be handed down.

The question before the court is the government's appeal from the decision of the Supreme Court of the District of Columbia modifying the 1920 consent decree to an extent permitting the packers to engage in wholesaling groceries, in addition to meat. The packers did not appeal from the lower court's refusal to modify the decree so as to permit them to engage in retailing meats, but the court may have the right, as a matter of law, to consider this question also.

John Lord O'Brian, Assistant Attorney General, argued that the original decree was based on the government's apprehension that the packers, having monopolized the meat industry, would develop a similar monopoly in the grocery field. He denied that conditions in the food industry had changed to such an extent as to remove this fear. Counsel for the packers contended, on the other hand, that there is no longer any danger of monopoly and that there is no reason now why competition in the food industry should be restricted by the exclusion of the large packers as competitors.

SELF-SELLING packages can offset busy, or lazy, retail clerks. A customer, waiting to be waited on, gazes absently at the shelves, and the manufacturer whose package is a visual stimulus to buy is doing his biggest selling job right there. Factors that make a package self-selling were examined and discussed by some 7,000 attendants at the Packaging Exposition and Clinic at the Palmer House, Chicago, Ill., March 7 to 12.

For the consumer, Katherine Fisher pleaded for containers easy to open and neat when they are opened. For production men, Francis Chilson pleaded for standardization on acceptable, simple designs, and for rapid elimination of a container once obsolete. For stockholders, R. L. Beach pleaded for better knowledge of effect of packages on unit cost of sales.

For the attractive exterior of its product for attractive exteriors—Linit (per-

—AND THE NEXT

MAY

3 — Millers' National Federation, Edgewater Beach Hotel, Chicago, Ill.

19-26—American Millers' Association (mills under 300-bbl. capacity), Watterson Hotel, Louisville, Ky.

23-26 — American Association of Cereal Chemists, Statler Hotel, Detroit, Mich.

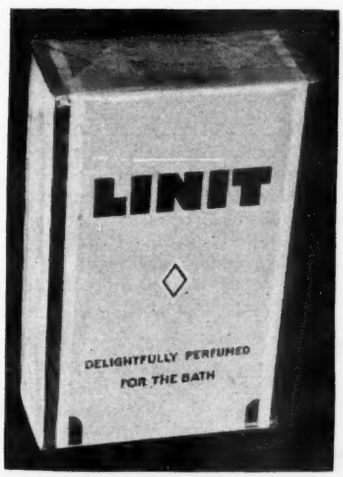
23-27—National Confectioners' Association (convention and exhibition), Atlantic City Civic Auditorium, Atlantic City, N. J.

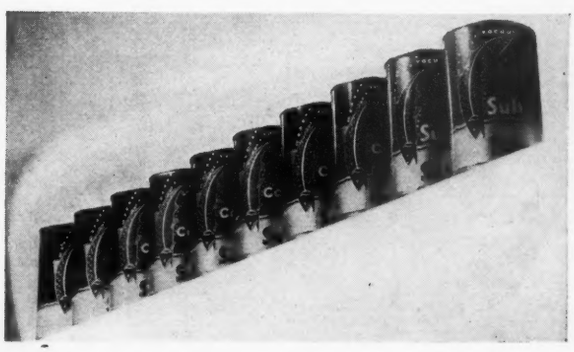
Do you know of a national convention that we have neglected to list? Please let us know.

"Well done," the judges said of them

Food manufacturers took four of the packaging awards at the Chicago Packaging Exposition, took them with staples—starch, sugar, catsup, and the lowly "tall salmon." To National Sugar Refining Co. went the "best family of packages" award for their Jack Frost group: to Quaker Maid Co. (A.&P.) the honorary award for best in metal cans (below)

To Corn Products Refining Co., the Irwin D. Wolf "best package" award for Linit





To Curtice Bros. Co., the honorary award for the best family of glass containers

fumed starch for the bath)—Corn Products Refining Co. received the Irwin D. Wolf award for the best package of the year.

THE GROCERY INDUSTRY, away back in October, 1928, held a trade practice conference under auspices of the Federal Trade Commission. The original rules formulated by the group were announced on Jan. 16, 1929. Then they were forgotten. Now the Federal Trade Commission, digging down into its files, has reformulated them, brought them back to light. Group I of the rules, relating to violations of the law, condemns such unfair trade practices as secret rebates, price discrimination, lottery schemes, commercial bribery, misleading advertising, slack-filled containers, below-cost selling to injure a competitor.

The fact that brokers, wholesalers, and independent retailers, but not chain stores, were represented at that long-forgotten conference probably accounts for the fact that Group II rules, "accepted as expressions of the trade," register mild disapproval of forceful use of buying power, "loss-leaders," and the practice of "others" acting in the capacity of brokers. Other "expressions of the trade" disapprove of failure to publish public price lists, of compelling purchases of groups of products as a condition to the purchase of one, of failure to fill or accept orders, of substitution, "free deals," and jobbers who "snipe" drop-shipment business from legitimate wholesalers.

SPECIFIC, scholastic, without "conventional stimulation," the bakery engineers' meeting dug down into everyday problems. Enzymatic activity of flours, functions of shortening, drew delegates to the meeting room in the Edgewater Beach Hotel, Chicago. Production of cracked wheat breads and bakery products involving the use of wheat germs were subjects that got attention. Delegates spoke their minds. The indefinite definitions for milk bread as promulgated by the Food and Drug Administration came in for criticism, and there was wide disagreement as to the interpretation of this definition.

Growth of mold on bread came in for much discussion. Sanitation and air washing were the methods of prevention most frequently mentioned; use of hypochlorite to sterilize equipment and wagons was explained. Contamination of waxed paper in storage, particularly where stale returns come into the plant, was cited as a cause of mold.

In the cake section, discussion treated elimination of unprofitable varieties, choice of ingredients to suit the housewife's taste, delivery problems. Hours were spent on whipped cream—how to whip it, how to keep it whipped. Everyone went home with formula books bulging.

NO HORRID OGRE, says Frank A. Horn of government control. The president of the Merchants Refrigerating Co., New York, N. Y., testifying before a Senate judiciary subcommittee as to the merits of the cold-storage industry's trade practice code, said that many in the industry would welcome reasonable government regulation. With N. A. Emmertz, of the Chicago Cold Storage Warehouse Co., he urged that the Nye bills, putting teeth in trade practice codes, be approved. Subcommittee senators had pointed out that enforcement of a provision that selling below cost is an unfair trade practice would amount to government price fixing.

Mr. Emmertz blamed weakness of the code approved in 1919 to Federal Trade Commission vacillation. It needs, he said, the force of law behind it. One of the Nye bills provides that codes once adopted by a majority of an industry and approved by the Commission shall be binding on the industry as a whole.

FRESH fruit exporters have not been singing the "Marsellaise." From March 10 to March 16 they fretted, fumed, and wondered what would happen to fruit, particularly apples, then on the way to France. One importer alone had 15,000 cases of apples on the high seas. Cause of the excitement was a decree published in the French *Journal Officiel* for March 9 prohibiting importation into France of certain kinds of fresh fruit from United States, Australia, Canada, Japan, and New Zealand, unless the French Minister of Agriculture was satisfied that such fruit did not carry San Jose scale. As the original decree gave no indication of what would satisfy the Minister to this effect, exporters saw visions of apples, pears, and grapefruit rotting on the piers at Havre. There were veiled hints that French farmers feared the increased scale of American fruit exports more than the scale of San Jose.

U. S. Ambassador Edge, besieged by tearful pleas, used his influence in Paris. When conditions of importation were announced on March 16, they were far less drastic than had been feared. As telegraphed to the State Department, they read as follows:

A—Requirements for future shipments:
1. A certificate of inspection delivered by the competent authorities of the country of origin guaranteeing absolutely that the fruit does not carry San Jose scale.
2. A sanitary control on arrival except for oranges, lemon, grapefruit.
3. Entry into France only permitted through ports of Havre, Bordeaux, Marseilles, Dunkirk or Paris.
4. Transit of fruit through France is not allowed in bulk but is authorized in containers such as cases, barrels, sacks, boxes, and all similar containers.

B—Shipment in warehouse or in transit on March 9.

Apples and pears from Washington, Oregon, and California in boxes and wrapped in paper may be admitted without inspection.

All other apples and pears must be submitted to special inspection. All other fruit may be admitted without inspection.

From all parts of the country, samples of bread and cake were gathered for the exhibit of the American Society of Bakery Engineers. After eye inspection was over, bakery engineers removed the wrapping, compared flavor and texture by taste and smell.

TRADE NOTES

ARKOL PRODUCTS CO. has been organized in Chicago, Ill., to manufacture and distribute flavoring extracts. A. L. Van Winkle, A. L. Werzer, and C. A. Leroy are owners.

BIRDSEYE PACKING CO., Boston, Mass., received its first shipment of quick-frozen meats from the Hanson Packing Co., Butte, Mont., during the week of March 1. The shipment was made in a silica gel refrigerator car and consisted chiefly of lamb cuts. A second shipment went to the Pacific Coast.

BROOK HILL LABORATORIES, INC., Genesee Depot, Wis., has begun the production of Vitamin-D certified milk by the addition of irradiated yeast to the diet of the cows. The process is licensed under the Steenbock patent by the Wisconsin Alumni Research Foundation.

EMULSOL CORP., of Chicago, Ill., has won its suit against the FRIGID EGG CO. and the SAR-A-LEE CO., Cleveland, Ohio. The U. S. District Court held the Epstein patent covering the product marketed as "Emulsol" valid and infringed, and issued a permanent injunction.

FOSTER D. SNELL, INC., consulting firm of chemists and engineers, Brooklyn, N. Y., has acquired the Official Testing Laboratory, New York, N. Y., conducted since 1905 by R. O. Brooks. Mr. Brooks, who has specialized in food and drug work, will continue with the Snell organization.

FROSTED FOODS CO., INC., and GENERAL SEAFOODS CORP., subsidiaries of GENERAL FOODS CORP., were freed of a charge of patent infringement when the U. S. District Court at Boston, Mass., dismissed charges brought by Paul Willar Petersen in August, 1930, that the Birdseye process

of quick-freezing infringed his patents in this field.

HAPPINESS CANDY STORES, INC., an affiliate of Loft, Inc., New York, N. Y., is again involved in legal controversy following a suit filed by a minority stockholder charging dissipation of assets by the management and requesting that receivers be appointed. Charles G. Guth, president of the two companies, has branded the charges "malicious and false."

LEVER BROTHERS Co., Cambridge, Mass., internationally important soap manufacturer, will soon enter the hydrogenated oil shortening business on a large scale. A plant is now under construction at Edgewater, N. J.

PACIFIC FRUIT & PRODUCE Co., Medford, Ore., has purchased the holdings of the Medford Fruit Co. The transfer includes one of the largest pear orchards in Oregon.

PACIFIC FRUIT EXPRESS Co., San Francisco, Calif., owned and operated by the SOUTHERN PACIFIC Co. and the UNION PACIFIC SYSTEM, is building 100 new refrigerated freight cars.

PARKER, MCCRACKEN & POTTER Co., Boston, Mass., has been organized by a merger of the J. M. MCCRACKEN Co. and the PARKER COFFEE Co. This combined organization has acquired the controlling interest in the DELANO, POTTER Co., one of the oldest coffee and tea organizations in New England. A new plant to handle the combined business is now being installed.

J. FRED SCHMIDT PACKING Co., Columbus, Ohio, has introduced a new product known as Fansee Roll sandwich meat. Considerable expansion is planned.

SIEBEL INSTITUTE OF TECHNOLOGY, Chicago, Ill., is celebrating its sixtieth anniversary. In its early days, it represented one of the first steps in the application of scientific research to the food industries. Important alumni meetings are scheduled later in the year.

B. F. TOMPKINS ICE CREAM Co., Flint, Mich., is expanding its territory by the erection of a plant in Cleveland, Ohio. Ice cream in 22 flavors will be manufactured.

PERSONAL

FRANCIS CHILSON, production consultant, has formed a partnership with EMIL A. SCHAEDLER, package designer, to be known as Chilson & Schaedler. Offices are at 101 West 31st St., New York, N. Y.

ROYAL S. COPELAND, U. S. Senator from New York, is one of the directors of the newly organized R. M. Haan Food Products, Inc. R. M. HAAN, famous restaurateur, is the head of the organization, which will specialize in imported foods and condiments.

ROBERT L. GERDES, Memphis, Tenn., was elected president of the American Society of Bakery Engineers at the recent convention in Chicago. He succeeds Ross E. ANDERSON, Los Angeles, Calif. CARLOS S. PICKERING of Los Angeles has been elected first vice-president to succeed EARL A. COX, of Jamaica, N. Y.

ROBERT C. HIBBEN has been appointed acting executive secretary of the International Association of Ice Cream Manufacturers to carry forward the work of the late FRED RASMUSSEN. Mr. Hibben has been head of the bureau of service and statistics of the association for the past six and one-half years. Previously he was editor of the *Ice Cream Trade Journal.*

HENRY HINRICHS has been made general manager of the Booth Fisheries Co., Chicago, Ill., in an extensive reorganization which followed the death of K. L. AMES, chairman of the board. In addition to a number of new directors, a new president, JOSEPH C. MARKLEY, was elected to succeed P. L. SMITHERS, resigned. Mr. Markley has been a director of Booth Fisheries for the past fifteen years. Mr. Hinrichs, the new general manager, was assistant general manager of Booth Fisheries for seven years, but has recently been connected with Lay Brothers, Sandusky, Ohio.

L. S. HOLLER, formerly connected with Cherry-Burrell Corp. at Cedar Rapids, Iowa, has been appointed manager of the butter department of Telling-Belle Vernon Co., Cleveland, Ohio.

J. J. MCALEESE has been elected president and general manager of the Pittsburgh Provision & Packing Co., Pittsburgh, Pa. He has been connected with the company for more than 30 years.

MARTIN E. MURRAY, formerly with the California Packing Corp., has been appointed Columbus (Ohio) district manager for Foodtown Kitchens, Inc.

JULES L. RICHON has been elected president of Candy Brands, Inc., Brooklyn, N. Y., to succeed E. T. BEDFORD. Mr. Bedford had been president of the company since its organization a little over a year ago. Mr. Richon has previously been connected with Frank G. Shattuck Co. and with Henry Heide, Inc.

A. A. SCHAAL, formerly director of the Technical Institute of the Biscuit and Cracker Manufacturers' Association, has joined Lever Brothers Co. He will be director of the sales service laboratory for the new hydrogenated oil shortening to be made by Lever Brothers.

W. F. SCHLESINGER, formerly superintendent of the Brooklyn plant of Candy Brands, Inc., has joined Ross & Rowe, Inc., in charge of sales and service work in the eastern Atlantic states. A. TOM NEWTH will handle similar work for Ross & Rowe, Inc., in the New England territory. Mr. Newth has been plant superintendent at H. D. Foss Co. and at Paul F. Beich Co.

E. A. STUART, a pioneer in the milk canning industry, has resigned the presidency of the Carnation Co. to become chairman of the board of directors and of the executive committee. He will be succeeded as president by E. H. STUART, his son, who has been executive vice-president at the headquarters in Milwaukee, Wis. The newly elected president has been active in the organization since graduating from college in 1911.

WILLIAM H. WHITE has been made head of the division of truck crop and garden insects in the U. S. Department of Agriculture's Bureau of Entomology. He has been acting head of this division since the resignation of JOHN E. GRAF a year ago, and has been connected with the bureau for more than fourteen years.

OBITUARY

GUSTAVUS A. VON BRECHT, founder and president of the Brecht Candy Co., Denver, Colo., died Feb. 26 at his winter residence in Los Angeles, Calif.

ILKO CHEMA, for 30 years connected with the National Sugar Refining Co., at Yonkers, N. Y., died on March 5 at the age of 50. Mr. Chema was born in Austria-Hungary and came to this country as a youth.

E. M. DURHAM, a pioneer in the cottonseed products industry, died in Vicksburg, Miss., on Feb. 29 at the age of 88. He had been retired for a number of years. Mr. Durham was the founder and first president of the Interstate Cottonseed Crushers' Association, now the National Cottonseed Products Association. He was born in Scotland, first entering the oil milling industry in 1877 in Memphis, Tenn. Later he organized the Refuge Oil Co., with headquarters in Vicksburg.

PHILIP DREESBACH, a chemist associated with the Corn Products Refining Co. for more than 25 years, died on Feb. 29 at Montclair, N. J. Although a native of Beardstown, Ill., he received his technical training at the University of Berlin, Germany. He was a member of the Chemists Club, New York, N. Y.

O. A. HARLAN, general manager of the California Prune and Apricot Growers' Association, San Jose, Calif., died Feb. 27. For a number of years he conducted his own fruit packing business as the O. A. Harlan Co., one of the units merged to form the Prune and Apricot Growers' Association.

JOHN C. JUHRING, former president and chairman of the board of directors of Francis H. Leggett & Co., one of the largest wholesale grocery firms in the country, died on March 10 in New York, N. Y. He was about 80 years old. Mr. Juhring was connected with the Leggett organization for 58 years. He was elected to the presidency following the death of Francis H. Leggett in 1910. In 1921 he became chairman of the board, resigning a few years ago.

ROGER W. LOVELACE, an official of Armour & Co., located at Buenos Aires, Argentina, died on March 7. He had formerly been employed by Armour & Co. in Chicago and Omaha.

GEORGE W. MACKIE, a director and former secretary of Van de Kamp's Holland Dutch Bakers, Los Angeles, Calif., died in Los Angeles March 4. He was 71 years of age. Joining the Van de Kamp organization in December, 1918, Mr. Mackie served as secretary, director, and purchasing agent for ten years. He was born in Chatham, N. B.

JULES ARNOLD MONET, sales manager of the Baltimore refinery of the American Sugar Refining Co., died on March 17 in Baltimore, Md. Born in Switzerland in 1883, Mr. Monet had been connected with the sugar company since 1916. He was formerly sales manager in the New York area.

CHRISTIAN SAUSER, for 50 years a Swiss cheese manufacturer, both in Switzerland and in the United States, died at his home near New Philadelphia, Ohio, on Feb. 26. He was 77 years of age.

THE BUSINESS PAGE

1931 Meat Consumption Slightly Higher

A SLIGHT increase in total production and consumption of meat in the United States during 1931 as compared with 1930, when production and consumption were the smallest since 1922, is estimated by the U. S. Bureau of Agricultural Economics. Production of all meats last year was 16,777,000,000 lb., or 1.4 per cent more than in 1930. Consumption of meats is estimated at 16,530,000,000 lb., or 1 per cent more than in 1930. Most of the surplus of production over consumption was exported.

There was an increase in slaughter supplies of all livestock, except cattle, last year. Fewer cattle were slaughtered than in the preceding year, but because they were heavier, the production of beef was 56,000,000 lb. greater than the 6,076,000,000 lb. produced in 1930. Production of veal last year is placed at 860,000,000 lb., an increase of 27,000,000 lb. over the preceding year; production of lamb and mutton is estimated at 878,000,000 lb., an increase of 58,000,000 lb.; and production of pork was 8,907,000,000 lb., an increase of 98,000,000 lb. over 1930. Lard production last year is placed at 2,385,000,000 lb., of which approximately 25 per cent was exported. Total exports of all meats last year were 223,000,000 lb., or 122,000,000 lb. less than in 1930, and the smallest for any year in the present century.

The Bureau finds that the per capita consumption of meat in the United States averages a little more than one-third of a pound a day. Total per capita consumption of meats last year was 133.2 lb., or about ½ lb. per capita more than in the preceding year.

Business Undecided

Disturbed by the unsettled state of government finances and continued refusal by banks to give credit, business is not taking the definite upturn thought likely a month ago.

The Business Week index for the week ending March 19 shows business conditions to be 56.9 per cent of normal, in comparison with 59.2 per cent for week ending Feb. 20. This unfavorable index is offset by several favorable factors which, if allowed to develop, will bring an upturn in the general business curve.

A weighted price index continues to show a decrease in general commodity prices, amounting to 1.17 per cent for the week ending March 19 as compared with the week ending Feb. 20. Food prices had a marked decrease during the week of Feb. 27, but by March 19 had recovered to a 2.8 per cent increase relative to the week ending Feb. 20.

Continued decrease in purchasing capacity of wage earners and lower salary groups is reflected in the decrease of 6.09 per cent in A. & P. tonnage sales for February as contrasted with February, 1931.

Basis for the Curves

Retail food prices, factory employment, factory payrolls and wholesale prices are based on indexes of the Department of Labor. Cost-of-living index is that of the National Industrial Conference Board. Electric power consumption figures are furnished by *Electrical World*.

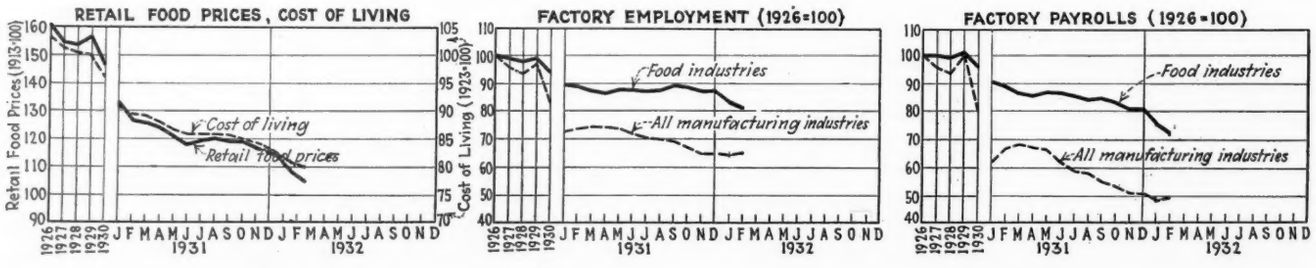
Canning Crop Plans For 1932

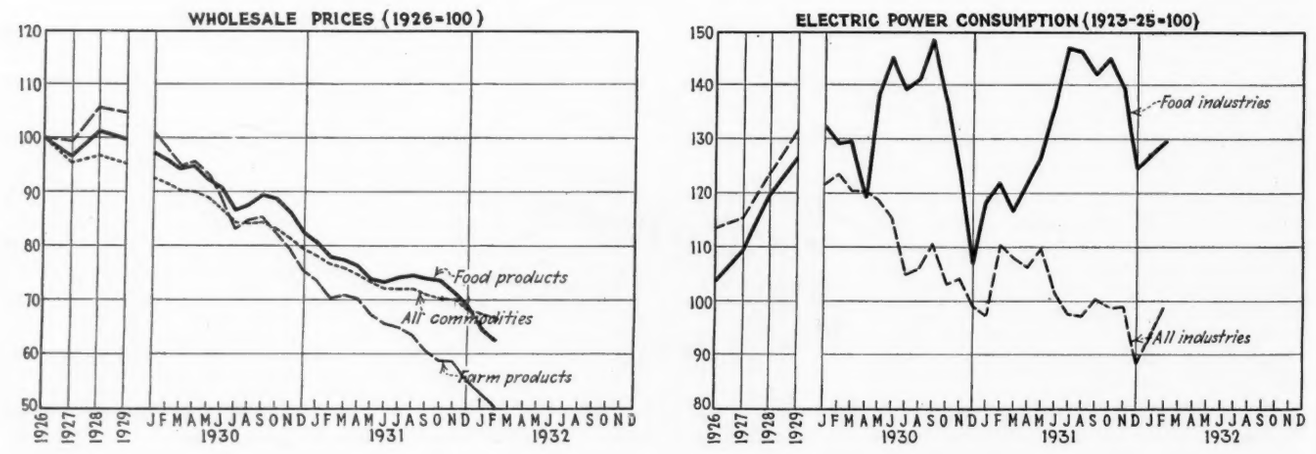
FEWER snap beans and less sweet corn, but a normal tomato acreage for canning crops in 1932 is indicated by an early report from the U. S. Department of Agriculture. The reports are from nearly 700 canners who represent about one-third of the acreage of the three crops. Canners in general, according to Prof. M. P. Rasmussen, of the New York State College of Agriculture, are uncertain about plans for the approaching season's plantings.

Reports from 230 tomato packers show that these canners plan to make contracts for about the same acreage as last year. The average yield in 1931 was the lowest in 14 years. If the 1931 acreage is maintained and the 5-year average yield is obtained, the 1932 yield may be about 20 per cent greater than last year's crop, he says.

Sweet-corn canners plan about 32 per cent less acreage than in 1931, when 359,000 acres was harvested. The estimates of 105 canners indicate a planting of about 230,000 acres in 1932, compared to 316,000 acres as the average for the past 5 years.

If all of the snap-bean canners curtail acreage in proportion to the 125 reports, about 39,000 acres may be harvested in 1932, according to Prof. Rasmussen. Reports indicate a reduction of about one-third from the 1931 acreage of 54,000 acres, which, at usual yields, would make a crop of 57,000 tons in 1932, compared with 69,100 tons last year and 68,100 tons for the 5-year average. These estimates, cautions Prof. Rasmussen, are only estimates of intentions to plant, and are not actual plantings.





NEW EQUIPMENT FOR FOOD MANUFACTURERS

Tank Car for Dry Foodstuffs

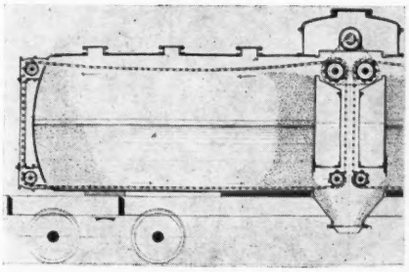
Bulk handling of dry, granular, or powdered materials is now being accomplished with shipping economies that have characterized bulk handling of liquids for several years. After approximately two years of research and road tests the General American Tank Car Corp., Chicago, Ill., announces its Dry-Flo tank car.

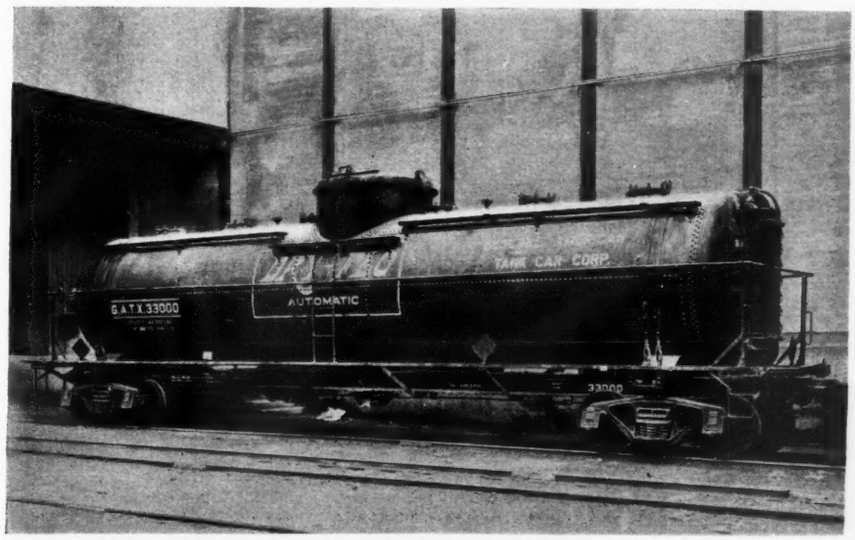
Externally this car has an appearance similar to that designed for liquids. Internally it consists essentially of two material-containing compartments with motor and unloading drive gears in a third and central compartment which is accessible through a central manhole opening. The two end compartments are vented at the bottom into a central discharge chute. Drag-chain conveyors, operating over sprocket gears, located in the central compartment and at the ends of the tank, are drawn from each end toward the center of the car. Material in the car is dragged along with the chain and dropped into the discharge chute. The chains turn upward and return across the top of the car to the ends. Because this unloading mechanism operates at low speed and only infrequently, it is said to be more enduring than the car itself.

This manner of handling such foodstuffs as beans, flour, semolina, milk powder, granulated sugar, and similar dry food materials eliminates expense of shipping containers, loading and unloading labor, and wastage due to dusting or broken bags or barrels. Savings as high as $2 per ton in shipping costs have been reported during the test period. Since these cars have a shipping capacity of 1,600 cu.ft., the savings on one trip are approximately $60 on dry foodstuffs; $120 on heavier materials.

The cars are watertight, which prevents damage to and loss of contents, and are fitted with several openings on top to facilitate loading. They were developed to handle a wide diversity of dry materials.

Illustrative drawing showing longitudinal section of car

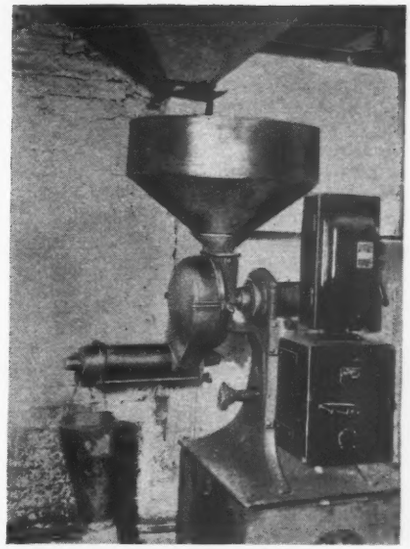




Coffee Uniformly Mixed During Grinding

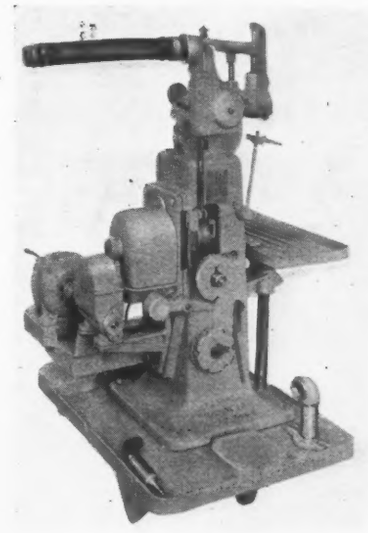
Uniform distribution of chaff and fines throughout the package or bag of ground coffee is attained by the "Compactor" mill of Jabez Burns & Sons, Inc., 11th Ave. and 43d St., New York, N. Y. This unit is adaptable to the attrition type of mill and is for coffees having a grind of 4½ or finer. When coffee is ground as fine on older types of attrition mills there is a prominent separation and stratification of chaff, fines, and coarser particles.

By having the mill, which can be adjusted to give the desired degree of fineness, discharge into the compactor blending unit, instead of directly into the package or bag, stratification is prevented. Increased demand for drip coffee has made the finer ground coffee more in demand for restaurant, hotel, and lunch-counter trade and has been responsible for the development of this type of attrition mill. Older types of attrition mills have a grinding capacity of 350 lb. per hour, whereas the Compactor type is reported as having a capacity of 1,000 lb. per hour.



Filling Machine for Semi-Liquid Foods

Quick cleaning and rapid change-over to handle different kinds of food pastes and various sized containers are the outstanding features claimed for the filling machines recently announced by the F. J. Stokes Machine Co., Philadelphia, Pa.



Parts that come in contact with the food materials being handled are removable for cleaning purposes and, when desired, can readily be replaced by interchangeable parts.

Jams, preserves, mayonnaise, molasses, scrapple, fish pastes, and peanut butter are some of the food products that are filled into containers ranging in capacity from ¼-pt. tubes to 5-gal. cans. The quantity of material discharged at one time depends upon the length of piston stroke for which

the machine may be set. Sixty cubic inches is the maximum discharge for one complete stroke. When containers having capacities that are multiples of 60 cu.in. are to be filled, a repeat action attachment may be added, which will impart automatic action to the piston and give the desired volume discharge into each container.

Regardless of container size, the discharge action is initiated by the container when it comes into position under the nozzle and is terminated by the thumbscrew adjustment regulating the length or the number of piston strokes.

The machine requires a ½-hp. variable-speed motor that operates from a light socket, occupies a floor space of 2x3 ft., is on a wheeled base and subject to be moved from one department to another, and may be fitted with a heated hopper. An operating speed of as much as three times that of hand-filling is claimed. Type of material being handled, size of container and discharge nozzle, and temperature of material directly influence speed of operation.

Protectively Lined Steel Drums

Shipping of foods containing acids or acid-forming constituents in steel drums has been made more feasible by the enamel-like protective sanitary coatings developed by the National Steel Barrel Co., Cleveland, Ohio.

The coatings are neutral in taste, odor, and chemical action with acid or acid-forming foods and can be varied in composition to correspond with specific characteristics of product to be shipped in

the drums. All types are in liquid form and are sprayed on the interior of the barrel and inside of the heads. As the barrel passes through a continuous baking oven at a temperature of 350 to 500 deg. F. for a period of 40 to 50 minutes the coating is baked on so firmly that the drums can take the place of wood, glass-lined, or tin containers formerly used. One type of coating used contains rubber as an ingredient and, when solvent is baked out, leaves a hard thin coating of rubber on the inner surface of the steel drum.

Studies are being made to determine optimum ingredients for coatings for specific uses in handling edible oils, fruit juices, milk products, malted foods, tomatoes, and similar foods.

THE MANUFACTURERS OFFER

Air Filters — Continuous operating air filters manufactured by the Northern Blower Co., West 65th St. & Barberton Ave., Cleveland, Ohio, are illustrated and described in Bulletin No. 500-1, entitled Norblo.

Delivery Trucks—In attractively bound and illustrated booklets, the Twin Coach Corp., Kent, Ohio, calls attention to its twin coach units for milk and bakery delivery purposes.

Cork Products—In a 20-page booklet entitled "Jointite," L. Mundet & Son, Inc., 461 Eighth Ave., New York, N. Y., gives useful data and other information on the uses and costs of cork for insulation purposes.

Water-Treating Equipment—In a 28-page illustrated booklet, the Permutit Co., 440 Fourth Ave., New York, N. Y., discusses water treatment and describes equipment for that purpose.

Fine Coffee Grinding—In illustrated leaflet No. 351, Jabez Burns & Sons, Inc., 11th Ave. and 43d St., New York, N. Y., announces its compactor mill for grinding drip and urn type coffee.

Gear-motors—Leaflet No. 20536 describes in detail the construction and characteristics of the units in which a speed reducer is combined with an induction motor. Westinghouse Electric & Manufacturing Co., Nuttall Works, Pittsburgh, Pa.

Industrial Chemicals—The new year book of Monsanto Chemical Works, St. Louis, Mo., is a beautifully illustrated 28-page booklet giving the 1931 annual report and other company information, including views of construction completed during 1931.

Precision Instruments—In general catalog No. 1,000, C. J. Tagliabue Manufacturing Co., Park and Nostrand Aves., Brooklyn, N. Y., illustrates and gives specifications and prices on all types of instruments for indicating, recording and controlling temperatures, pressure, humidity and time; also gas analysis, condensation and liquid level.

Trade Show Problem—Metropolitan Life Insurance Co., New York, N. Y., in a 22-page booklet, discusses how exhibitors are meeting the trade show problem and gives a list of 84 association organizations that have contributed to the study.

Recipes Using Milk—Quantity recipes for cafeterias, lunchrooms and the like are given in a 48-page booklet compiled by the Evaporated Milk Association, 203 North Wabash Ave., Chicago, Ill.

Canned Food Recipes—Bulletin No. 110-A of the National Canners' Association, Washington, D. C., prepared by Alice M. Child and Florence Richardson, of the Food Research Laboratory Experiment Station, University of Minnesota, supersedes a previous bulletin giving canned food recipes for cafeterias and restaurants.

Valves and Drains—Circular No. 830, on flow characteristic and construction of Fisher valves; No. 835, on condensate drainer; Bulletins No. 210X, on top relief valves; No. 410X, on non-freezing drain valves; No. 205X, on standard pressure release valves; No. 320X, on ammonia back-pressure valves for liquid level-control evaporators or expansion coils; No. 315X, on automatic ammonia expansion valves for commercial refrigerator systems, and No. 305X, on pressure control or condensing water regulator, have been issued by the Apex Regulator Co., Marshalltown, Iowa.

Refrigeration — Split-stage low-temperature refrigeration and installations are described and illustrated in Bulletin No. 208-A of the Frick Co., Waynesboro, Pa.

Ball Bearings — Dimensions, load data and list prices of New Departure ball bearings are given in a 66-page 8th edition of a thumb indexed catalog, compiled by the New Departure Manufacturing Co., Bristol, Conn.

Packing House Equipment—In Catalog No. 17, the Allbright-Nell Co., 5323 Southwestern Blvd., Chicago, Ill., illustrates and describes processes and equipment used in modern rendering operations.

THE GOVERNMENT PUBLISHES

DOCUMENTS ARE AVAILABLE *at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated, pamphlet is free and should be ordered from bureau responsible for its issue.*

Government Specifications. Issued by Federal Standards Stock Catalogue Board as follows: Canned blackberries, canned squash, dried currants, evaporated or dried apricots, canned blueberries (huckleberries), canned plums, canned raspberries, canned carrots, canned sweet potatoes, grape juice, canned loganberries, evaporated or dried prunes, lard substitutes (including vegetable shortening), beef kidneys, beef hearts, fresh beef, noodles, macaroni and vermicelli, canned corned beef, canned sliced dried beef, canned beef tongue; 5 cents each.

Commerce Year Book, Volume II. Foreign countries. Department of Commerce, cloth-bound volume; $1.

Fresh Fruit Composition, by Charlotte Chatfield and Laura I. McLaughlin. Department of Agriculture, Circular 50; 5 cents. October, 1931, revision, giving proximate analyses.

Maple Syrup and Sugar, by A. H. Bryan and others. U. S. Department of Agriculture, Farmers' Bulletin 1366. Reprint without revision; 5 cents. Methods of production.

Crab Canning, by Kokichi Oshima. Bureau of Fisheries, Investigational Report 8; 5 cents.

Principles of Net Preservation—1931. Bureau of Fisheries, mimeographed bulletin, Sp. 690-D.

Marine Animal Oils, by Roger W. Harrison. Bureau of Fisheries, Investigational Report 7; 15 cents. Reviews United States markets.

Alaska Fish Law. Department of Commerce Department, Circular 251, 18th edition. Laws and regulations for protection of fisheries.

Wages and Hours of Labor. Bulletins of U. S. Bureau of Labor Statistics: 547. Cane-Sugar Refining Industry, 1930, 10 cents; 535, Slaughtering and Meat-Packing Industry, 1929, 20 cents.

Antiseptics and Disinfectants, by G. L. A. Reuhle and C. M. Brewer. U. S. Department of Agriculture, Circular 198; 10 cents. U. S. Food and Drug Administration methods of testing.

Agricultural Bulletins, by Catherine E. Pennington. U. S. Department of Agriculture, Miscellaneous Publication 128; 15 cents. List of bulletins issued by experiment stations, 1929 and 1930.

Statistical Abstract of the United States, 1931. Bureau of Foreign and Domestic Commerce, bound volume; $1.25. A digest of data collected by all statistical agencies of the government as well as those of a considerable number of private agencies and several states.

CONSTRUCTION NEWS

Bakery—Kroger Grocery & Baking Co., A. S. Grogg, Gen. Mgr., 3801 Vista Ave., St. Louis, Mo., and 35 East 7th St., Cincinnati, O., temporarily postponed taking of bids for a 4 story, 85 x 190 ft. bakery including 43 x 63 ft. garage, boiler room, salvage room, office, also extensive alterations to existing buildings, including loading dock, etc., at 1311 South 39th St., St. Louis. $700,000. Emil E. Niemann, 3916 Shaw Ave., St. Louis, Archt.

Bakery—Frank Vitale, 7035 69th St., Glendale, L. I., N. Y., plans construction of a 2 story, 25 x 100 ft. bakery at Foch Blvd. and 220th St., St. Albans. A. P. Sorice, Jr., St. Albans, Archt.

Biscuit Factory—Loose-Wiles Biscuit Co., Commerce Bldg., Kansas City, Mo., awarded contract for first unit of factory including 1 story, 140 x 220 ft. warehouse and garage at 600 East Gage Ave. and Avalon Blvd., Los Angeles, Calif., to C. J. Kubach-Snyder Co., 730 Chapman Bldg., Los Angeles. $100,000. Total cost $1,500,000.

Brewery—Ambassador Breweries Ltd., Sarnia, Ont., plans construction of a brewery. Estimated cost $100,000.

Brewery—Vancouver Malt & Sake Brewing Co,. 1445 Powell St., Vancouver, B. C., plans a 3 story, 30 x 50 ft. addition to brewery on Powell St. Estimated cost of building $12,000. Gardiner & Mercer, 330-31 Birks Bldg., Vancouver, are architects. This is preliminary to larger development later in year. Company has been bought by new interests headed by F. Sick, 6576 Marguerite St., Vancouver.

Plant—Soo Falls Brewing Co., 503 Bay St., Saulte Ste. Marie, Ont., plans construction of plant for the manufacture of soft drinks to include cold storage plant at Fort William, Ont.

Cheese Factory—Kraft-Phoenix Cheese Co., 400 Rush St., Chicago, Ill., will build a cheese factory including new boiler room, boilers and equipment at Marshall, Ind. Estimated cost $25,000. Work will be done by day labor.

Creamery Plant—Banner Creamery Co., c/o O. D. Dillingham, Abilene, Tex., awarded contract for construction of a 1 and 2 story, 58 x 151 ft. creamery plant at San Angelo, to H. L. McBride, 509 Koberlin, San Angelo. Owner purchasing equipment.

Creamery—Golden State Co. Ltd., 425 Battery St., San Francisco, Calif., plans construction of a creamery plant on North First St. Estimated cost $40,000.

Creamery—Mistletoe Creameries, A. J. White, V. Pres., 219 Austin St., San Antonio, Tex., subsidiary of Borden Co., having preliminary surveys made for a 2 story creamery plant on Jones St. Machinery and equipment will be required.

Dairy Plant—Bowman Dairy Co., Janesville, Wis., awarded contract for a 1 story, 20 x 60 and 40 x 200 ft. receiving depot to O. Bakkend Co., Rockford, Ill.

Dairy Building—J. E. Harshbarger, 406 24th St., Altoona, Pa., will soon award contract for a 2 story, 75 x 100 ft. dairy building on 24th St. Estimated cost $50,000. McCormick Co., 121-27 South Negley Ave., Pittsburgh, is architect.

Dairy Plant—Queensboro Dairy Co., 35 12th Ave., Astoria, L. I., N. Y., has work under way on construction of a dairy plant including bottling rooms, etc., at 41st St. and 35th Ave., Long Island City. Estimated cost to exceed $130,000 including equipment. Riger Building Corp., 145 West 41st St., New York, general contractor.

Dairy Plant—Rogers Road Dairy Co. Ltd., Toronto, Ont., plans a 60 x 120 ft. addition to dairy plant. Estimated cost $20,000.

Dairy Plant — J. Weissglass, 2014 Forrest Ave., Elm Park, S. I., N. Y., will soon award contract for construction of a 1 story dairy plant including pasteurizing, creamery and bottling plants, etc., at Mariners Harbor. Estimated cost $40,000. M. G. Uslan, 57 Bay St., St. George, S. I., is architect.

Ice Cream Plant—J. M. Horton Ice Cream Co. Inc., 205 East 24th St., New York, N. Y., plans construction of ice cream plant at Middletown. Estimated cost $40,000. Architect not selected. Maturity indefinite.

Ice Cream Manufacturing Plant—Puritan Ice Cream Co., 3895 Washington St., Roslindale, Mass., awarded contract for construction of a 2 story ice cream manufacturing plant at Barnstable to H. Manganiello, 83 West Salden St., Mattapan. Estimated cost $50,000.

Ice Cream and Milk Pasteurizing Plant—Foremost Dairies Inc., Jacksonville, Fla., awarded general contract for remodeling building, formerly owned by Milldale Co. at College and Rubel Sts. and Willow Branch Ave., for ice cream manufacturing and milk pasteurizing plant to A. L. Clayton, Jacksonville. Estimated cost $40,000.

Milk Plant—La Camas Valley Co-Operative Association, Proebsted, Wash., will build a 35 x 50 ft. addition to plant including cheese vats and necessary apparatus to handle 35,000 lbs. of milk daily. $25,000.

Pasteurizing Plants—Borden Farm Products Co., 110 Hudson St., New York, N. Y., plans alterations to plants at Lexington and Grand Aves. and Adelphi and Fulton Sts., Brooklyn. A. Ullrich, 373 Fulton St., Brooklyn, is architect.

Cold Storage Plant—Department of Public Works, St. Johns, N. F., plans to expend $70,000 to $75,000 for alterations to government cold storage plant.

Cold Storage Plant—Farmers Association, E. T. Ross, Chairman, 47 Balsam St., Port Arthur, Ont., plans construction of a cold storage plant. Interested in prices on equipment.

Cold Storage Plant—Puyallup & Sumner Fruit Growers Association, L. M. Hatch, Pres., Puyallup, Wash., awarded contract for a 1 story, 77 x 167 ft. warehouse and cold storage plant to S. R. Gray, Puyallup. $40,000.

Cold Storage and Packing Plant—Oliver Co-Operative Growers, Oliver, B. C., plans construction of a cold storage plant, also addition to packing plant. Estimated cost $66,000. Robert Lyons, Penticton, is architect.

Evaporator and Warehouse — Port William Fruit Co., Port William, N. S., plans construction of an evaporator and warehouse. Estimated cost $40,000.

Ice Plant—Marlin Ice & Cold Storage Co., Marlin, Tex.,, awarded contract for construction of a 1 story, 47 x 70 ft. ice plant to Frank Petzold, Marlin.

Ice Plant—M. K. Pickett & Son, 21 Townsend St., Newton, N. J., will build a 1 story artificial ice manufacturing plant on Water St. Estimated cost $40,000. Private plans. Work will be done by separate contracts.

Ice Plant—G. R. Pratt Ice Co., R.R. No. L., Pueblo, Colo., will soon start work on construction of artificial ice manufacturing plant at Vineland. Maturity early summer.

Ice Plant—S. Boyton Ferriss, 44 West St., New Milford, Conn., awarded contract for a 1 story ice manufacturing plant to Adams & Hansen, Housatonic Ave., New Milford. Estimated cost $40,000. York Ice Machinery Co., 2nd Ave. and 42nd St., Brooklyn, N. Y., awarded contract for machinery.

Ice Plant—Pure Ice Co., Mill St., Nanticoke, Pa., plans to remodel old foundry building for artificial ice plant including installation of equipment. Estimated cost $200,000.

Ice Plant Addition—Norwood Ice Co., A. F. Grant, in chg., Merrick Lane, Northampton, Mass., awarded contract for a 2 story addition to artificial ice plant to Aquadro & Cerrutti, 33 Wilson Ave., Northampton. Estimated cost $40,000.

Ice Storage Plant—Marysville Ice & Cold Storage Co., Marysville, Calif., has work under way on construction of an ice storage plant 1,200 ton capacity to W. W. Williamsen, 320 Market St., San Francisco.

Ice Manufacturing Plant—Clear Ice Co., F. Hain, 52 Meadow St., South Norwalk, Conn., having plans prepared for construction of a 1 story, 45 x 150 ft. ice plant at Danbury. Estimated cost $50,000. H. Koerner, 83 Fairfield Ave., Bridgeport, is architect.

Ice Manufacturing Plant—Harris Ice Co., Day St., Leominster, Mass., awarded contract for a 1 story, 60 x 70 ft. ice manufacturing plant on North Main St. to Proffit & White Construction Co., 13 Oliver St., Fitchburg; equipment to Frick Co., 185 Lincoln St., Boston. Total cost $40,000.

Ice Manufacturing Plant—N. King, 20 Boston Road, Middletown, Conn., awarded contract for construction of a 1 story ice manufacturing plant to O'Brien Bros., Middletown. $40,000.

Ice Manufacturing Plant—Leominster Ice Co., 229 Pleasant St., Leominster, Mass., awarded contract for construction of an ice manufacturing plant to J. Lagey, 416 Pleasant St., Leominster. Estimated cost $40,000.

Grocery Warehouse — Greenspan Bros., 226 Washington St., Perth Amboy, N. J., awarded contract for construction of a 1 story, 165 x 260 x 460 ft. grocery warehouse on Fayette St., Perth Amboy, to B. Goldstab & Sons, 62 Catalpa St., Perth Amboy. Estimated cost $300,000.

Grocery Buildings — Western States Grocery Co., L. S. Skaags, Mgr., Salt Lake City, Utah, plans to remodel chain of 12 stores. Estimated cost $100,000. Work will be done by day labor.

Produce Warehouse—Zwick & Schwartz, 12 Union St., Middletown, N. Y., will soon award contract for a 1 story, 100 x 135 ft. produce warehouse including refrigeration system. Estimated cost $40,000. MacManus & Gleich, 11 West 42nd St., New York, are architects.

Peanut Factory—Farmers Peanut Co., Elizabeth City, N. C., plans to rebuild factory destroyed by fire. Estimated cost $200,000. Maturity 1932.

Sugar Plant Addition — British Columbia Sugar Refining Co. Ltd., Vancouver, B. C., plans addition to beet sugar plant at Raymond, Alberta. Estimated cost $250,000. Maturity indefinite.

Flour and Feed Mill—A. Pritchard, Kazulazua, Que., plans construction of a flour and feed mill. Estimated cost $50,000.

Grist Mill—J. Miller, Cornwall, Ont., plans erection of a saw and grist mill at Osnabruck Centre. Estimated cost $25,000.

Saw and Grist Mill—Clarence Nott, Fingal, Ont., plans construction of a new saw and grist mill. Estimated cost $25,000.

Grain Elevator—Albany Port District Commission, 74 Chapel St., Albany, N. Y., will receive bids until April 14 for design and construction of a grain elevator, 2,000,000 bu. capacity.

Grain Elevator—Canada Malting Co. Ltd., Toronto, Ont., having plans prepared for addition to grain elevator. Estimated cost $100,000.

Grain Elevator—Consolidated Milling Co., F. Burns, Gen. Mgr., Winfield, Kan., awarded contract for enlargement of grain elevator including five storage tanks, of 500,000 bu. capacity to McDowell Construction Co., Denver, Colo. Estimated cost $100,000.

Grain Elevator — Farmers National Grain Corp., 733 Omaha Grain Exchange Bldg., Omaha, Neb., acquired a site and plans construction of a grain elevator, 500,000 bu. capacity at Kearney. Architect not selected. Farmers West Central Grain Corp., lessee.

Grain Elevator—Missouri Kansas Elevator Co., Railway Exchange Bldg., St. Louis, Mo., and Missouri Pacific Ry. Co., Missouri Pacific Bldg., E. A. Hadley, Ch. Engr., plan to rebuild grain elevator destroyed by fire. Estimated cost $150,000. Edwin Ahlskog, 407 South Dearborn St., Chicago, Ill., is engineer.

Grain Elevator—Searle Grain Company Ltd., Arran, Sask., plans construction of a new grain mill.

Packing Plant—H. Grover Co., 715 West 41st St., Chicago, Ill., completed plans for a 1 story, 124 x 138 ft. packing plant. Estimated cost $100,000. H. C. Christianson, 59 East Van Buren St., Chicago, is architect.

Packing and Cold Storage Plant—Dugdale Packing & Cold Storage Co., R. F. D. No. 5, St. Joseph, Mo., awarded contract for construction of a 1 story, 50 x 66 ft. packing and cold storage plant on South 11th St. Rd. to North St. Joseph R. E. Co., 119 South 6th St., St. Joseph.

Packing Plant (Citrus)—Missouri Pacific Railway Co., Missouri Pacific Bldg., St. Louis, Mo., awarded contract for construction of a 2 story, 48 x 120 ft. citrus packing plant at Harlingen, Tex., to W. A. Parks, Harlingen.

Packing Plant—Packing House Market Co., c/o W. M. Koeglein, 1011 East Commerce St., San Antonio, Tex., awarded contract for construction of a 1 story, 38 x 121 ft. packing plant to Lloyd Freeland, 1510 Virginia St., San Antonio. $15,000.

Abattoir Addition—Feldman Bros., A. Feldman, in charge, Laurel St., Elizabeth, N. J., rejected bids for 1 story addition to abattoir building. $40,000. A. J. Silberstein, 892 18th Ave., Newark, Archt. Project may be abandoned.

Beef Cooler—Stadler Engineering Co., 140 Liberty St., New York, N. Y., Engr., will receive bids after March 28 for construction of a 1 story beef cooler at Astor St., Newark, N. J., for Leo Schloss Inc., ft. of Astor St., Newark. Estimated cost $140,000.

Packing Plant (Meat)—Crocker-Wallace Packing Co., Sedalia, Mo., will soon receive bids for a 1 story meat packing plant. Estimated cost $25,000. Bonnell-Tohtz Co., 1515 North Grand, St. Louis, is architect and engineer.

Packing Plants—Swift & Co., Durham, N. C., awarded contract for construction of two packing plants at Greensboro to J. H. Bryan, Raleigh, $25,000 each. Equipment will be purchased, also let contract for 2 story, 85 x 100 ft. wholesale meat market building at Wilkes-Barre, Pa., to William Steele & Sons Co., 124 N. 15th St., Philadelphia.

Sausage Plant—Essem Packing Co., Inc., 101 Beacon St., Lawrence, Mass., having revised plans prepared for alterations to sausage plant. Estimated cost $40,000. Worcester Tram Rail Co., Inc., 10 T. Wharf, Boston, is engineer.

Sausage Factory—Kocher & Larson, 6405 South Halsted St., Chicago, Ill., Archts., receiving preliminary bids for construction of a 2 story, 58 x 75 ft. sausage factory including stuffing, cooling and drying rooms, storage space, etc., at 1100 West 67th St. for owner, c/o architects. Estimated cost $35,000.

Slaughter House—Chico Meat Co., Humboldt Road, Chico, Calif., having plans prepared for construction of a 1 story, 40 x 180 ft. slaughter house. C. Cole, National Bank Bldg., Chico, is architect.

Slaughter House—A. De Fede, 228 Winant St., Port Richmond, N. Y., will build a 1 story, 30 x 88 ft. chicken slaughter house at Richmond Terrace and Clove Rd. Work will be done by separate contracts under the supervision of B. Graziano, 48 Grand Ave., Port Richmond, Archt., which have been awarded.

PATENT DIGEST

Baking and Milling

Gas-fired Traveling Ovens With Heat Exchanger for Supplying Steam to Baking Chamber—Louis Charles Reese to Baker Perkins Co., Inc., Saginaw, Mich. No. 1,844,178. Feb. 9, 1932.

Roller-Type Dough Kneader With Arms of Varying Length — Claude D. Pierre, Dallas, Tex. No. 1,845,329. Feb. 16, 1932.

An Endless Tray Conveyor Type of Oven With Upper and Lower Rows of Heating Tubes—Horace A. Bodge, White Plains, N. Y. No. 1,845,578. Feb. 16, 1932.

Machine for Kneading Stiff Dough—Giovanni Crespi, Milan, Italy. No. 1,838,-533. Dec. 29, 1931.

Grain Washing and Drying Machine—David Geddes, Berkeley, Calif. No. 1,839,-214. Jan. 5, 1932.

A Flap-Folding Mechanism for Bread-Wrapping Machine—Carl Littlefield to Battle Creek Wrapping Machine Co., Battle Creek, Mich. No. 1,839,567. Jan. 5, 1932.

Multiple Baking Pan Units—Louis H. Debs, Chicago, Ill. No. 1,840,310. Jan. 12, 1932.

Dough Divider in Which Dough Is Forced Into Measuring Compartments by Centrifugal Action—James Garvey, Los Angeles, Calif. No. 1,840,578. Jan. 12, 1932.

Pie Pan With Sections for Individual Portions—Theodore M. Mears to the Tri-Pie Corp., Brooklyn, N. Y. No. 1,841,495. Jan. 19, 1932.

Pie Crust Put in Sectioned Pan by Mechanical Means — David Trompeter, Amityville, N. Y., to the Tri-Pie Corp., Brooklyn, N. Y. No. 1,841,507. Jan. 19, 1932.

Reel-Type Baking Oven—Louis D. Houlis, Dallas, Texas. No. 1,841,813. Jan. 19, 1932.

Doughnuts Sugar-Coated in a Closed Box-like Unit With a Rotating Sugaring Device—James J. Kaufmann, Bayside, N. J., to Doughnut Machine Corp., New York, N. Y. No. 1,842,101. Jan. 19, 1932.

Recovery of Waste Products From Flour Milling Rich in Mineral Salts, Enzymes, and Vitamin B—William W. Didrick, State College, Pa. No. 1,842,933. Jan. 26, 1932.

Method for Preparing Dough From Flour Containing More Than One Per Cent of Added Vegetable Lecithin—Friedrich Wilhelm Thiele to Hanseatische Muhlenwerke Aktiengesellschaft, Hamburg, Germany. No. 1,843,051. Jan. 26, 1932.

Canning and Glass Packing

Can Drainer—Albert R. Thompson to Anderson-Barngrover Manufacturing Co., San Jose, Calif. Nos. 1,843,995 and 1,843,-997. Feb. 9, 1932.

Feeder and Timer for Can Drainer—Albert R. Thompson to Anderson-Barngrover Manufacturing Co., San Jose, Calif. No. 1,843,996. Feb. 9, 1932.

Machine for Grading Mixed Peas During Washing Operations—John Schmidt to Sprague Sells Corp., Hoopeston, Ill. No. 1,847,309. March 1, 1932.

An Exhaust Box With Upright Rotatable Wheels Operating About Slightly Tilted Axis—Albert R. Thompson to Anderson-Barngrover Manufacturing Co., San Jose, Calif. No. 1,837,502. Dec. 22, 1931.

Confectionery

Small Compartmented Unit for Melting and Holding Confection Coatings at Desired Temperature for Dipping—Ora E. Harris, Kearney, Neb. No. 1,847,760. March 1, 1932.

Conveyor Type Machine for Rolling and Cutting Candy—Ferdinand G. Henry, Philadelphia, Pa., to The Sweets Co. of America, Inc., New York, N. Y. No. 1,849,095. Jan. 5, 1932.

Method of Reconditioning Chilled and Grainy Chocolate for Coating Use—George Ralph Baker, London; James Washington Epps, Warlingham; and George William Perks, Southport, England, to Baker-Perkins Co., Inc., Saginaw, Mich. No. 1,843,859. Feb. 2, 1932.

An Endless Conveyor System of Molds for Confectionery Manufacture—Howard C. Baum, Mt. Vernon, N. Y., to National Equipment Co., Springfield, Mass. No. 1,839,731. Jan. 5, 1932.

Dairy and Egg Products

Method and Means of Breaking and Separating Eggs—Frank C. Chapman, Modesto, Calif. No. 1,837,357. Dec. 22, 1931.

Horizontal Ice Cream Freezer With Beater Element Consisting of Plural Flexible Blades—George F. McDougall, Portland, Ore. No. 1,837,565. Dec. 22, 1931.

Egg Separating Machine—Morten Hansen and William G. Young, Los Angeles, Calif. No. 1,838,620. Dec. 29, 1931.

Physical Character of Milk Curd Determined by Mechanical Means — Rueben L. Hill to Utah State Agricultural College, Logan, Utah. No. 1,840,392. Jan. 12, 1932.

Compact Vertical Heat Exchanger for Adjusting Temperature of Milk—Harvey Feldmeier to Cherry-Burrell Corp., Little Falls, N. Y. No. 1,840,573. Jan. 12, 1932.

Copies of Patents

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Photostatic copies of foreign patents may be obtained at the same address, prices being forwarded on application.

Copies of patents should be ordered by number, as titles used in this digest seldom correspond with title of patent.

Methods and Means for Mixing Coloring Material With Margarine — Warren W. Helle, Hinsdale, Ill., to Durkee Famous Foods, Inc., Chicago, Ill. No. 1,836,026. Dec. 15, 1931.

Neutral, 100 Per Cent Milk-Fat Produced Centrifugally—Homer Cloukey, Lansdowne, Pa., and B. H. Clark, Villanova, Pa., to the Sharples Specialty Co., Philadelphia, Pa. No. 1,837,205. Dec. 22, 1931.

A Portable Low-Capacity Cheese Press—John Dagand, Albany, Wis. No. 1,840,936. Jan. 12, 1932.

Milk Homogenized Under Pressure and Temperature Condition to Give Curd Tension Below 45 Grams—Arnold H. Johnson and Samuel M. Weisberg to Research Laboratories of National Dairy Products Corp., Inc., Baltimore, Md. No. 1,841,184. Jan. 12, 1932.

Milk Emulsified With Crushed Sesame to Inhibit Rancidity of Milk Fat When Dried—Sidney Musher, Washington, D. C. No. 1,841,842. Jan. 19, 1932.

Cheese Preserved by Packing in Valve-top Type Can—Lore Alford Rogers, Washington, D. C., to the Government and People of the United States of America. No. 1,842,365. Jan. 19, 1932.

Method of Packing and Freezing Egg Mixture Free of Foam and Entrapped Air—Marvin C. Reynolds, Oak Park, Ill., and Benjamin R. Harris, Chicago, Ill. No. 1,842,733. Jan. 26, 1932.

Fruits and Vegetables

Pickles Treated With Caustic Solution Before Being Given Final Pickling Treatment—Edmund A. Hey to Rosefield Development Corp., Alameda, Calif. No. 1,845,748. Feb. 16, 1932.

Vitamin A and B Concentrate in Tablet Form From Blended Dehydrated Vegetables—Robert K. Prince, Westfield, Mass., to William J. Davidson, Newton, Mass., and Elbert A. Harvey, Brookline, Mass., as Trustees. No. 1,845,813. Feb. 16, 1932.

Fruit Disinfected by Treatment With Solution Containing Hypochloride of an Alkali-Forming Metal — Henry B. Slater, Riverside, Calif., to Food Machinery Corp., San Jose, Calif. No. 1,842,696. Jan. 26, 1932.

Horseradish Relish Protected From Discoloration by Use of Sulphur Dioxide — Benjamin R. Harris, Chicago, Ill. No. 1,842,720. Jan. 26, 1932.

Cherry Pitting Machine With a Brush Feed Regulator—Charles T. Howson, Silver Creek, N. Y., to Huntley Manufacturing Co., Brockton, N. Y. No. 1,843,283. Feb. 2, 1932.

General Equipment

Top and Bottom Carton Sealing Machine—Wallace P. Kimball, Elmhurst, N. Y., and Cornelius Braren, Queens Village, N. Y., to Standard-Knapp Corp. of New York, Brooklyn, N. Y. No. 1,844,661. Feb. 9, 1932.

Compartmented Display and Storage Case for Frozen Foods—Donald E. Rutishauser to Hussmann-Ligonier Co., St. Louis, Mo. No. 1,845,888, Feb. 16, 1932.

Small Portable Units for Cleaning, Moistening and Heating Air—Garrit Van Daam, Buffalo, N. Y. No. 1,846,233. Feb. 23, 1932.

Hydraulic Press With Automatic Control of Platen Travel Which Acts Independently of Pressure—Walter Ernst to Hydraulic Press Manufacturing Co., Mt. Gilead, Ohio. No. 1,847,073. March 1, 1932.

An Upright Unit for Filtering and Cooling Air.—Hans Herman Sandel, Brooklyn, N. Y. No. 1,848,576. March 8, 1932.

Meat Packing

Machine for Filleting Fish — James J. Barry, Halifax, Nova Scotia, to Maritime Fish Corp., Ltd., Montreal, Quebec. No. 1,845,645. Feb. 16, 1932.

Support to Prevent Distortion of Meat During Chilling—Henry H. McKee to Swift & Co., Chicago, Ill. No. 1,846,744. Feb. 23, 1932.

Meat-Cheese Loaf Prepared by Foil Wrapping Cheese-Coated Meat and Heating—Clinton Henry Parsons to Swift & Co., Chicago, Ill. No. 1,847,223. March 1, 1932.

Hams Molded and Cooked in Container With Opening and Pressure Regulating Device at One End—Walter Bellinghausen to Swift & Co., Chicago, Ill. No. 1,835,628. Dec. 8, 1931.

Miscellaneous Products and Processes

Process for Refining Sugar—Walter P. Spreckels, Yonkers, N. Y. No. 1,844,020. Feb. 9, 1932.

Machine for Manufacture of Ravioli—Arthur E. Barili, Los Angeles, Calif. No. 1,844,142. Feb. 9, 1932.

Strands of Alimentary Paste Formed Into Hanks Mechanically—Paul Wilhelm Funck, Stuttgart, Germany. No. 1,844,152. Feb. 9, 1932.

Soluble Mixture Containing Pectin, Sodium Bicarbonate, Tartaric Acid, and Sugar—Albert Leo, Chicago, Ill. No. 1,844,666. Feb. 9, 1932.

Self-Sealing Container for Jellies or Preserves With Low Melting Wax on Bottom and Side Walls — Margaret Grant, Akron, Ohio. No. 1,846,052. Feb. 23, 1932.

Method for Irradiating Liquids and Materials in Solutions—Charles Everett Bills to Mead Johnson & Co., Evansville, Ind. No. 1,848,305. March 8, 1932.

A Floating Pan Method for Freezing Fish—Arthur C. Walworth, Newton, Mass. No. 1,836,097. Dec. 15, 1931.

Peanuts Blanched While Moving Longitudinally Along Rollers Equipped With Alternate Fixed and Flexible Elements—Alexander Lewinski, Chicago, Ill. No. 1,842,909. Jan. 26, 1932.

Package and Methods for Refrigerating With Solid CO_2—Howard S. McIlvain, Belleville, N. J., to Dryice Equipment Corp., New York, N. Y. No. 1,843,038. Jan. 26, 1932.

Undesirable Flavors in Fermented Cereal Beverages Prevented by Boiling Wort With Hops Under Vacuum and Finally Treating With Carbon Dioxide—Max Hamburg, one-half to Eduard Jalowetz, Vienna, Austria. No. 1,843,321. Feb. 2, 1932.

Machine for Forming and Cutting Ravioli—George Pieretti to Delray Corp., San Francisco, Calif. No. 1,843,626, Feb. 2, 1932.